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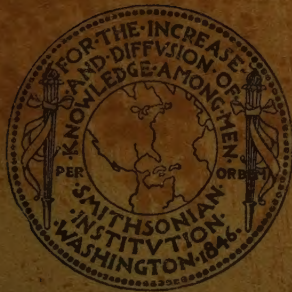
Bulletin 100

VOLUME 6, PART 9

CONTRIBUTIONS TO THE BIOLOGY OF THE
PHILIPPINE ARCHIPELAGO AND
ADJACENT REGIONS

THE TREE SNAILS OF THE GENUS
COCHLOSTYLA OF MINDORO PROVINCE
PHILIPPINE ISLANDS

BY
PAUL BARTSCH



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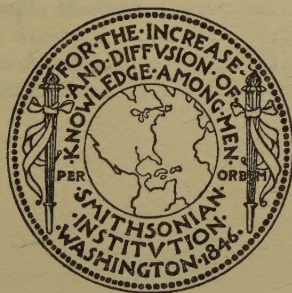
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THE TREE SNAILS OF THE GENUS COCHLOSTYLA OF MINDORO PROVINCE, PHILIPPINE ISLANDS

By PAUL BARTSCH

INTRODUCTION

IN NO other area in the entire Philippine Archipelago do we find a greater confusion in our knowledge of its tree-snail fauna than in Mindoro, the main island of this province. Though Mindoro has been contributing specimens since the very early days of contact with civilization, most of them came from the well-known ports on the northeastern part of the island. The reason for this is voiced by Dr. Dean C. Worcester, who states on page 362 of his book "The Philippine Islands", published in 1899:

Nowhere in the northern Philippines is there an island so little known, or one so universally avoided by white men. The natives frequently refer to it significantly as the "white man's grave." At the present time it is celebrated chiefly for the unsavoury reputation of its people, the heaviness of its rainfall, and the deadliness of the miasma in its fever-smitten lowlands.

There was a time when Mindoro was famous for other things. So much rice was formerly raised along the coast as to cause the island to be named "the granary of the Philippines," and the population of the numerous coast villages seems to have consisted chiefly of peaceable, law-abiding Tagalogs. All this has long since been changed. The prosperity of the civilized natives served to attract the attention of the Moros, who repeatedly raided their towns, rapidly thinning the population. An epidemic attacked the buffaloes, nearly exterminating them, and leaving the natives without means of tilling their land; and cholera did the rest.

To-day the once rich fields have for the most part grown up to forest land, and the island is a rendezvous for desperate criminals, who escape from the neighbouring provinces and seek refuge in Mindoro, well knowing that if they once reach the forest there they are safe from pursuit.

The few poverty-stricken villages on the east coast are supposed to be under Spanish protection and control. How much that protection amounts to I shall attempt to show later. There are villages on the west coast also. White men who value their lives do not often visit them.

In the interior of the island are a number of lofty mountains, the highest peak attaining an altitude of 8,865 feet. These mountains and the adjacent lowlands are clothed in magnificent forest which the hand of man has never disturbed. Under the shadows of its mighty trees dwell a race of primitive savages, the Mangyans. They bear a very bad reputation, which is wholly undeserved.

Between the mountains and the west coast are extensive plains, covered with high grass. East of the mountains are heavily timbered lowlands, crossed by

numerous rivers. The surface details given in the best charts are wholly unreliable, and such large rivers as the Baco are left out altogether.

The rainfall is enormous. There are no statistics available, but it rains heavily during nine months of the year, and not infrequently during the other three, as I have learned to my sorrow. Exploration in the interior can be carried on only at the height of the dry season, in March, April, and May.

There is no anchorage at Calapan, and the surf runs so heavily during October, November, and December that steamers are often forced to carry the mails by.

The only Europeans in the island outside of Calapan are a half-dozen friars, and at the capital there are only the necessary officials, and one or two shopkeepers who are too poor to get away.

On our first trip to the Philippines we purposely put Mindoro last on our list of islands to be visited, knowing that if we were fortunate enough to escape the *tulisanes* we should still get the fever, and wishing to be able to start for home at once should it seriously disable us.

The first serious collecting in Mindoro was done by Hugh Cuming, who was probably the most successful collector of mollusks in his day. His visits to the Philippines extended from 1836 to 1839 and resulted in bringing to light more novelties than all the previously known species. They have been reported on by many writers, and a set is in the collection of the United States National Museum. Since some doubt has been raised about the localities cited by Cuming for some of his species, I quote from an article by W. J. Broderip, published in the Proceedings of the Zoological Society of London for 1840, pages 83-84:

Before, however, we commence our task, I must, in justice to him who has placed the materials in our hands, observe, that, to say nothing of the variety of new forms which he has been the means of bringing to light, those who cultivate this branch of zoology so highly interesting to the geologist, as well as the physiologist, owe him a large debt of gratitude, for information on a point of no small zoological importance. It is not very long since, that the localities ascribed to shells could in very few instances be depended upon. The cupidity of dealers, some years ago, not unfrequently prompted them wilfully to deceive those who gave extravagant prices for new shells on this point, and carelessness was generally the order of the day. Mr. Cuming, by his accurate notes, and the open publication of the places where every one of the multitudinous species and varieties collected by him was found, has mainly assisted in making a complete revolution in this department of the science, and has done more towards giving us data for the geographical distribution of the testaceous mollusca than any person who has yet lived.

I concur in Broderip's statement.

Hugh Cuming visited Mindoro and collected at Puerto Galera and Mansalay Bay.

W. W. Wood sent "many fine shells . . ." from the Philippine Islands to Isaac Lea, who described a number of species in the Transactions of the American Philosophical Society in 1840. No specific locality is given with any of Wood's shells, but the fact that *Cochlostyla cepoides* is here described shows that he must have been in the mountains of Lubang Island or had a collector there.

On January 24, 1842, a party of the United States Exploring Expedition stopped on the southwest corner of Mindoro and must have secured quite a lot of conspicuous shells, at least so the collections in the United States National Museum would indicate.

Dr. Carl Semper conducted scientific explorations in the Philippines between 1858 and 1864, which have resulted in that splendid series of volumes known as Semper's *Reisen im Archipel der Philippinen*.

Semper's servant, Antonio Angara, made a trip to northeastern Mindoro, which resulted in the discovery of some members of the genus *Cochlostyla*.

During the Spanish regime and up to the American conquest of the Philippines, J. F. Quadras occupied the position of chief forester of the islands. Quadras was an enthusiastic shell collector, and I was told by members of his family during my sojourn in the islands that he would appoint no one to his staff unless the appointee had similar tendencies. This was undoubtedly responsible for the magnificent collection that he amassed, which was displayed in the Philippine Section during the World's Fair in St. Louis in 1904. This collection was offered for sale in America by his son who failed to find a purchaser. It was stored for some time in the Chicago Academy of Sciences and then returned to Manila, where it now rests in the Philippine Bureau of Science, except for a set acquired by the Chicago Academy of Sciences and by them sold to the United States National Museum.

Quadras' finds were largely described by Dr. O. F. von Möllendorff and Joaquin G. Hidalgo, of Madrid, Spain. Many things from Mindoro Province are in the Quadras collections.

Dr. Otto Franz von Möllendorff, German Consul at Manila from 1886 to 1896, made known to the world the minute mollusks of the Philippines. His efforts added more than 800 species. His splendid collection rests in the Senckenbergische naturforschende Gesellschaft in Frankfurt-am-Main, from which a set of his duplicates has been secured for the United States National Museum, among which most of the old species from Mindoro are represented.

In 1887-8, Dr. J. B. Steere, with Dr. Frank S. Bourns, E. L. Moseley, Dean C. Worcester, and Mateo Francisco, collected natural-history material in the Philippines, Worcester and Bourns spending some time in northeastern Mindoro until forced out by malaria.

Two years later Worcester, Bourns, and Francisco, while on the Menage Expedition, made two trips to Mindoro, collecting from Calapan south to Lake Naujan and west to Mount Halcon. They made a splendid collection of mollusks, securing large series of the larger species represented in the region. This collection, which for a time rested in the Minnesota Academy of Sciences, has been purchased by the United States National Museum and has been available for study.

Students interested in field natural history will find Dr. Worcester's book a fascinating volume.

Dr. Worcester later became a member of the United States Philippine Commission and still later the Secretary of Interior of the Philippine Islands. During all this period, and later as a private citizen up to his death, he maintained an interest in the natural history of the islands and collected material that has been in my hands for report.

Col. Edgar A. Mearns, U. S. Army, made many collections during his periods of service in the Philippine Islands. Among his many expeditions he made one to Mount Halcon, the highest peak in Mindoro. On this expedition many land shells were collected. Among the novelties obtained on that expedition and here described is *Cochlostyla lillianae*, an exquisitely beautiful shell, of which, unfortunately, only the type is known.

To put definitely on record the ground covered by that Mount Halcon Expedition, I shall quote Colonel Mearns' itinerary:

Left Manila 7:30 p. m. October 30, 1906, on U. S. A. T. *Mindanao*. Party accompanied to Calapan by Horace C. Fletcher. Arrived Calapan daybreak October 31. Left Calapan in two native boats Nov. 1, arriving at Subaan, 9 m. NW. on the coast, at 3 p. m. Left Subaan 9 a. m. Nov. 2, marched 10 m. (5 air line) SW. to Binaybay River, camping on the mining claims of P. T. Bergen and R. E. Burris. Left Bergen Camp 7 a. m. Nov. 5 and marched SW. 1 mile to Mangyan clearing on top of hill, named Buena Vista, elevation 1,200 feet. Proceeded down S. trail to river named the Egbert, distance 1 mile; thence 300 yards down stream to Alag River. Crossed Alag at this point and followed Alag River upstream along east (R.) bank 2 miles to point where the Alag R. forks. Proceeded up east (R.) fork (main Alag R.) naming the west (L.) fork the Lewton R. 1 mile; camped at 4 p. m. (Camp No. 2). Nov. 8, left camp 8 a. m., marched up the Alag $1\frac{1}{2}$ m. to small falls, thence up small stream entering main Alag R. from the west (L. bank) 300 yards, thence up ridge on the south side of stream (R. bank) $\frac{3}{4}$ m. to Mangyan clearing at 2,500 feet elevation, Camp No. 3 at this point. Small stream $\frac{1}{4}$ m. down R. slope, to the SW. of camp.

Broke camp 7:30 a. m. Nov. 12, proceeding along trail on S. side of clearing to cogon-covered caingin on crest of ridge, same elevation as Camp No. 3 (2,500 feet); thence down Mangyan trail, south, to Alag River. Distance Camp 3 to Alag, 2 miles. Stream entering Alag R. a few yards above a Mangyan bejuca suspension bridge (7 strands) named the Halcon Bridge. The stream was named the Halcon River. We marched up Halcon R. 50 yards and thence up old Mangyan trail to the right (from left bank of Halcon River), SW., going up parallel to stream; camped at 3:30 p. m. at 3,300 ft. elevation (Camp No. 4). No water found near this camp.

Nov. 3. Broke camp at 6 a. m. Proceeded along ridge trail a short distance, following it down to caingin area east of ridge summit. Three houses in these clearings; one a mere framework, covered; two covered and inhabited. One large house near S. end of clearing, cleverly hidden (photographed). From this house a Mangyan trail leads down to the Bolton R., where we found plenty of water (as also in a small tributary nearer to the Mangyan house) and cooked breakfast. From camp No. 4 to Bolton R. crossing $\frac{3}{4}$ m. From Bolton R. proceeded SE. up ridge 1 mile to elevation of 4,500 feet. Camp No. 5. Water, small stream 300 yards down slope to the SW.

Left camp No. 5 at 8 a. m. Nov. 17, proceeding along trail on east side of ridge to series of flats at 6,300 feet elevation. Camp No. 6, named "Posey Flats" in honor of "Posey" (E. D.) Merrill, botanist of the party. Camp No. 5 to Posey Flats distance 1 mile.

Nov. 19, Merrill and Hutchinson completed chopping out a trail to main ridge of Halcon and along the main ridge nearly to the Peak, returning to Camp 6 at dark, wet, hungry, and tired. Rained hard until noon.

Nov. 20. Rained nearly all last night. High wind. Rained on.

During the explorations of the United States Fisheries steamer *Albatross* in the Philippines, we touched Mindoro and some of the adjacent islands, where I had an opportunity to make collections of land mollusks and other things.

On June 4, 1898, we anchored in Mansalay Bay, where I made collections on the west shore of the bay and along the river, entering it here; also along the northeast point of the bay.

On June 5 I covered half of the distance between the mouth of the river leading to Lake Naujan and the Lake, collecting at intervals.

June 8 and 9 we spent at Puerto Galera. Here I collected on Paniquian and Medio Islands, as well as on the part of Mindoro that forms the rest of the rim of the bay.

July 14 and 15 were spent collecting on Lubang Island. We visited Vigo Bay, Tilig Bay, Balikias Bay, and Loog Bay. From the latter place a couple of expeditions were made to the summit of Gunting Mountain, which among other things yielded a lot of the peculiar *Cochlostyla cepoides* (Lea).

The most thorough and important mollusk collecting yet done in Mindoro Province is in progress at the present time. Another apparently indefatigable and enthusiastic collector, Pedro de Mesa, is producing so many new and interesting finds that we may well believe that all the past efforts scarcely represent a reconnaissance. His splendid sendings made necessary the critical review here published, which I hope may produce a better understanding of the *Cochlostyla* fauna of the region.

Helicostyla and *Cochlostyla* were proposed by Férussac in the same work¹ as subgenera of *Helix*; *Helicostyla* was placed in the group *Helicoides*, and *Cochlostyla* in the *Cochloides*. For almost 40 years thereafter these two subgenera were considered to belong to different "genera" (groups we now would call families).

Beck² recognized these two subgenera, removing from them a number of what he considered unrelated species and adding others. For the first group he retained the name *Helicostyla*, but the second one he renamed *Orthostylus*. He still, however, kept them in separate "tribes" (or families). Pilsbry's citation of Article 28 of the International Rules³ has no bearing on the point in question, as Beck was

¹ Tableau systématique de la famille des limaçons, p. 24, 1821.

² Index molluscorum praesentis aevi musei principis angustissimi Christiani Frederici, pp. 36, 49, 1837.

³ See Nautilus vol. 46, p. 71, 1932.

not uniting two subgenera or genera to form one, but on the contrary was retaining both groups, merely suppressing one of Férussac's names in favor of a new designation.

Subsequent authors, Pfeiffer (1841-1877), Gray (1847), Albers, and the Adams brothers, all kept *Helicostyla* and *Cochlostyla* separate in different genera or supergeneric categories. Pfeiffer, it may be noted, in the first part of his *Symbolae*⁴ recognized *Cochlostyla* Férussac as one of his 18 valid genera, going still further in his restriction of the group than Beck, while *Helicostyla* he submerged in *Helix*. Later, however, in the same work he united *Cochlostyla* with *Bulimus*.

Von Martens, in his version of Albers' work⁵ was the first one to unite these two groups into one genus, which he called *Cochlostyla*, making *Helicostyla* the second subgenus under it. Hence von Martens is to be considered the first reviser, and the name he chose for the genus will stand according to Article 28 of the International Rules.

Thereafter, for 35 years, *Cochlostyla* was universally used for this group by such authors as Dohrn, Kobelt, Clessin, Nevill, Hidalgo, Semper, von Möllendorff, Fischer, E. A. Smith, Fulton, and Pilsbry (1891).

In 1895, however, Pilsbry, in his "Guide to the Study of the Helices"⁶ made *Helicostyla* the name of the genus in place of *Cochlostyla*, because of its prior position in Férussac's work and because of Beck's restriction and use of the subgenus *Helicostyla*. But we have shown that Beck maintained both groups equally, merely changing the name of *Cochlostyla* for some reason to *Orthostylus*. Both groups remained equally a heterogeneous mixture, *Helicostyla* containing three species of *Cochlostyla* and five of *Cepolis*, while *Cochlostyla* included seven species of *Cochlostyla* and seven of *Amphidromus*, besides an *Ampelita* and a *Caryodes*.

The first type designation for *Helicostyla* is apparently that of von Martens,⁷ who cited *Cochlostyla mirabilis* Férussac as type. Gray's designation of the same species might be considered questionable, as he uses the combination *Helicostyla* Beck, 1837. The first designation of *Cochlostyla* seems to be that of Pilsbry,⁸ who named *Cochlostyla metaformis* as type.

I shall not discuss specific problems in this introduction, preferring to treat these under the species that present points of particular interest. I have been largely influenced by problems of distribution and factors of isolation producing fixation, and the forms here named are zoogeographic races and not merely individual variations of size,

⁴ *Symbolae ad historiam heliceorum*, vol. 1, pp. 5, 21, 1841.

⁵ *Die Heliceen*, ed. 2, p. 173, 1860.

⁶ *Man. Conch.*, ser. 2, vol. 9, pp. 217-218, 1895.

⁷ Albers, *Die Heliceen*, ed. 2, p. 175, 1860.

⁸ *Nautilus*, vol. 46, p. 71, 1932.

shape, or color, which, though they look distinct when viewed separately, may be the offspring of one mother.

I am deeply indebted to the Coast and Geodetic Survey of the United States Department of Commerce for the splendid chart of Mindoro and the adjacent islands, no. 10, from which I am reproducing as plate 117 the northwestern end, as plate 116 the northeastern end, and as plate 118 the southern end; also as plate 119 the islands stretching to the northwest of Mindoro and as plate 120 those to the southeast of Mindoro. These plates show the territory where collecting has been done and also call attention to the large part of the interior, especially of the central portion of the island, still awaiting exploration and from which we may look for many new things.

A careful examination of these contour maps will reveal the greatly diversified topography of this province. We have here mountaintop after mountaintop rising to great elevations, Mount Halcon, its highest peak, registering 8,865 feet. A subsidence of comparatively little moment would split the region into many lesser islands, a fact that accounts for its greatly diversified fauna. The factors of isolation on these circumscribed areas over a long period have made possible the adjustments of the chemical constituents of the germ cells, as well as the adjustments of the organism as a whole, to the environmental factors presented by the restricted habitat.

Cochlostylas are tree snails that require a forest or tree habitat for their existence, and they are as effectively limited in their wanderings by the lowland cogon grass-covered areas as they would be if water separated the areas occupied by them.

Genus COCHLOSTYLA Férussac

In this extremely large genus, the shell presents an enormous range of variation in form. It may be lenticular, helicoid, or bulimoid; it may be nonumbilicate, rimate, or narrowly umbilicate; the outer lip may be almost without reflection or it may be strongly expanded and reflected. The columella may be simple, twisted, or toothed. The surface of the shell is covered by a periostracum, which is usually more or less hydrophanous and varies from a scarcely perceptible to a heavy cuticle. The sculpture never attains the strength of ribs, but the lines of growth in some species approach ribbing. Incised spiral lines or fine striations are usually present.

The shell of some species is unicolor, while others show axial bands or fulgurations, and may have spiral color bands that may be confined to the periostracum or may be part of the substance of the shell. Many colors and tints are represented in the color scheme of the genus.

Of the rest of the anatomy, Dr. Pilsbry states: ⁹

⁹ Man. Conch. ser. 2, vol. 9, pp. 216-217, 1895.

Foot without pedal margination; a small left body-lappet often developed; kidney elongated.

Jaw ribbed.

Radula with bluntly pointed or truncated mesocones on middle and lateral teeth, *without trace of side cusps*. Marginal teeth having the entocone indicated by a split in the broad inner cusp, a small simple ectocone being developed.

Genital system: Penis moderately long, passing into an epiphallus which bears the retractor; flagellum wanting. *Dart sack short and globose*, seated on atrium or low on vagina, *bearing an accessory sack into which the mucus gland opens*. *Mucus gland globular or oval, with a very short duct*, its thick wall composed of radially arranged follicles. Dart short, straight, and round in section. Spermatheca oval, on a long, branchless duct.

Cochlostylas are arboreal. The genus is almost wholly Philippine; a few species extend into Borneo, south to New Guinea, Moluccas, and the Solomon Islands. The genus has been divided into a host of subgenera or groups, a few of which, usually small aggregates, have quite distinctive characters, but most of them have members that represent bridging elements, which could be placed with equal claim in either of two of these groups. These subgroups, however ill defined they may appear to be, serve a useful purpose in a classificatory arrangement, and it is for that reason chiefly that most of them deserve retention.

Subgenus CORASIA Albers

In this subgenus the shell is depressed helicoid or lenticular, imperforate, usually with a more or less conspicuous peripheral keel. The outer lip is but slightly expanded and reflected. The periostracum is not hydrophanous.

Type: *Cochlostyla (Corasia) virgo* (Broderip).

A single species only, *Cochlostyla (Corasia) aegrota* (Reeve), is known from the Mindoro Province.

COCHLOSTYLA (CORASIA) AEGROTA (Reeve)

PLATE 94, FIGURES 1-3

- 1851. *Helix aegrota* REEVE, *Conchologia iconica*, pl. 22, fig. 95.
- 1853. *Helix aegrota* PFEIFFER, *Monographia heliceorum viventium*, vol. 3, pp. 191-192.
- 1854. *Helix aegrota* PFEIFFER, *Martini-Chemnitz Conchylien Cabinet*, ed. 2, vol. 1, Abt. 12, Theil 3, pp. 437-438, pl. 152, fig. 3.
- 1856. *Helix (Corasia) aegrota* PFEIFFER, *Malakozool. Blätter*, vol. 2, p. 144.
- 1859. *Helix aegrota* PFEIFFER, *Monographia heliceorum viventium*, vol. 4, p. 214.
- 1860. *Corasia aegrota* MARTENS, Albers, *Die Heliceen*, ed. 2, p. 171.
- 1868. *Helix aegrota* PFEIFFER, *Monographia heliceorum viventium*, vol. 5, p. 258.
- 1876. *Helix aegrota* PFEIFFER, *Monographia heliceorum viventium*, vol. 7, p. 328; in part.
- 1890. *Cochlostyla aegrota* HIDALGO, *Obras malacologicas*, p. 152; in part.
- 1890. *Cochlostyla aegrota* MÜLLENDORFF, *Ber. Senckenberg Naturf. Ges.*, 1890, pp. 230-231; in part.

1890. *Cochlostyla aegrota* PILSBRY, Man. Conch., ser. 2, vol. 6, p. 124 (in part), pl. 26, fig. 1.
 1891. *Helix aegrota* HIDALGO, Obras malacologicas, pl. 21, fig. 8.
 1895. *Helicostyla aegrota* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 219.
 1898. *Cochlostyla aegrota* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 105.
 1908. *Cochlostyla aegrota* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 107-108 (in part), pl. 21, fig. 4.
 1932. *Cochlostyla (Corasia) aegrota* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 335.

Shell thin, semitranslucent, depressed helicoid, with broadly conic spire, feebly angulated periphery, and a short, well-rounded, imperforate base. The shell is covered with a very thin periostracum, which is of a faint greenish yellowish tint, the shell substance itself being white with a bluish tint. Nuclear whorls 1.5, well rounded, smooth, forming an almost planorboid spire. The postnuclear whorls are strongly rounded and appressed at the summit, the appressed portion appearing as a slender white thread on the later whorls. They are marked by retractively curved, almost threadlike incremental lines, which are of irregular strength and spacing. These incremental lines are also present on the base. The early postnuclear whorls show indication of spiral sculpture, which becomes much enfeebled on the later turns. The aperture is broadly oval; interior bluish white; the peristome is narrowly expanded and reflected; the inner lip is rather broad, slightly excavated, and slightly sinuous. The parietal wall is covered by a moderately thick translucent callus.

The specimen described and figured, U.S.N.M. no. 314079, was collected by Quadras on Mindoro and is without specific locality. It has 4.6 whorls and measures: Length, 29.3 mm; greater diameter, 40 mm.

Subgenus CALOCOCHLEA Hartmann

In this subgenus the shell is helicoid or subglobose, imperforate. The periostracum is conspicuously marked with varied hydrophanous patterns.

Type: *Cochlostyla (Calocochlea) pulcherrima* (Sowerby).

There are a number of species of this subgenus from Mindoro Province. They are:

- Cochlostyla (Calocochlea) melanocheila* (Pfeiffer).
C. (C.) perpallida Bartsch.
C. (C.) aopta (Clench and Archer).
C. (C.) roissyana (Férussac).
C. (C.) gertrudis Möllendorff, Kobelt, and Winter.

COCHLOSTYLA (CALOCOCHLEA) MELANOCHLEA (Pfeiffer)

PLATE 94, FIGURES 4-7

1840. *Helix melanocheilos?* var. *lineolata* GRATELOUP, Act. Soc. Linn. Bordeaux, vol. 11, p. 163; not *Helix lineolata* Lamarck, 1822, Animaux sans vertèbres, vol. 6, p. 67.

1840. *Helix melanocheilos lineolata* GRATELOUP, Act. Soc. Linn. Bordeaux, vol. 11, pp. 397, 398, pl. 4, fig. 2.
1841. *Helix brunnea* SOWERBY, Proc. Zool. Soc. London, 1841, p. 40.
1842. *Helix brunnea* PFEIFFER, Symbolae, vol. 2, p. 69; not *Helix brunnea* Anton, 1839.
1842. *Helix melanocheila* PFEIFFER, Symbolae, vol. 2, p. 32.
1848. *Helix melanocheila* PFEIFFER, Monographia heliceorum viventium, vol. 1, p. 248.
1849. *Helix melanocheila* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, ed. 2, vol. 1, Abt. 12, Theil 1, p. 276 (in part), pl. 44, figs. 9, 10.
1850. *Callicochlias melanocheila* ALBERS, Die Heliceen, ed. 1, p. 106.
1851. *Helix melanocheila* REEVE, Conchologia iconica, pl. 19, figs. 80a, 80b.
1851. *Helix melanocheila* DESHAYES, Férussac's Histoire naturelle . . . mollusques . . ., vol. 1, p. 296, pl. 107, fig. 14.
1853. *Helix melanocheila* PFEIFFER, Monographia heliceorum viventium, vol. 3, p. 187.
1855. *Helix (Callicochlias) melanocheila* H. and A. ADAMS, The genera of recent Mollusca, vol. 2, p. 192.
1856. *Helix (Callicochlias) melanocheila* PFEIFFER, Malakozool. Blätter, vol. 2, p. 143.
1859. *Helix melanocheila* PFEIFFER, Monographia heliceorum viventium, vol. 4, p. 209.
1860. *Callicochlias melanocheila* MARTENS, Albers, Die Heliceen, ed. 2, p. 173.
1868. *Helix melanocheila* PFEIFFER, Monographia heliceorum viventium, vol. 5, p. 281.
1876. *Helix melanocheila* PFEIFFER, Monographia heliceorum viventium, vol. 7, p. 323; in part.
1877. *Cochlostyla melanocheila* SEMPER, Reisen im Archipel der Philippinen, vol. 3, pt. 2, p. 181.
1887. *Cochlostyla melanocheila* HIDALGO, Journ. Conchyl., vol. 35, p. 125.
1892. *Cochlostyla (Calocochlea) melanocheila* PILSBRY, Man. Conch., ser. 2, vol. 7, p. 150, pl. 30, figs. 17-19.
1895. *Helicostyla melanocheila* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 223.
1896. *Cochlostyla melanocheila* ELERA, Catalogo sistematico de toda la fauna de Filipinas, vol. 3, pp. 75-76.
1897. *Cochlostyla melanocheila* HIDALGO, Journ. Conchyl., vol. 44, pp. 266, 296, 330, 331, 341, 351.
1898. *Cochlostyla melanocheila* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 114.
1901. *Cochlostyla melanocheila* HIDALGO, Obras malacologicas, pt. 1, pp. 287-288, pl. 40, figs. 2, 3.
1909. *Cochlostyla (Callicochlias) melanocheila* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 157-158, pl. 31, fig. 6.
1932. *Cochlostyla (Calocochlea) melanocheila* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 335.
1933. *Helicostyla (Calocochlea) melanocheila* CLENCH and ARCHER, Papers Michigan Acad. Sci., Arts, Letters, vol. 17, p. 539.

Shell helicoid, covered with a rather thick periostracum of more or less wood-brown color, variously banded with spiral zones of darker brown. There is usually an almost black band of brown immediately above the periphery, while the peripheral zone in most instances, or

at least the space immediately below it, is a light zone of varying width. The periostracum on the base is usually lighter than on the upper surface and is banded with lighter spiral zones of varying width. The periostracum is darker brown, while the interior of the aperture is bluish white. The nuclear whorls are about 2, depressed, moderately well rounded, marked by lines of growth and the last portion of the last turn by the beginning of fine incised spiral lines. The postnuclear whorls are well rounded, appressed at the summit, and marked by fine incremental lines and spiral striations. The latter are stronger on the first postnuclear whorls than on the remaining turns. Periphery obsoletely angulated. Base somewhat inflated, strongly rounded. The aperture is broadly oval. The peristome is moderately strong, expanded, and reflected; the inner lip is somewhat excavated and gently curved.

This species seems to be widely distributed over northeastern Mindoro where it varies considerably in coloring and size.

A series of 78 specimens yields the following measurements:

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
106361.....	4.6	32.6	41.1	32.9
106361.....	4.4	29.4	41.2	33.0
130818.....	5.0	31.9	40.6	34.5
195407.....	4.3	32.2	47.5	36.3
195407.....	4.5	30.6	44.7	34.5
195407.....	4.6	32.8	46.0	36.0
195407.....	4.7	30.2	40.9	32.0
255821.....	4.5	30.6	43.3	33.6
255821.....	4.5	28.9	42.9	33.9
255821.....	4.7	31.7	41.9	32.2
255821.....	4.6	27.3	40.3	31.1
255821.....	4.8	33.5	44.7	35.9
255821.....	4.6	31.6	45.5	35.3
255821.....	4.5	30.3	42.6	33.5
255821.....	4.4	30.9	42.1	32.6
255821.....	4.3	31.6	48.6	37.0
255821.....	4.4	30.1	43.4	34.0
255821.....	4.3	26.6	38.9	29.9
255830.....	4.6	30.4	45.7	35.8
255830.....	4.5	30.7	42.8	33.0
255830.....	4.4	26.5	38.2	29.8
255830.....	4.5	29.5	41.8	33.2
255830.....	4.6	32.9	45.2	34.8
255830.....	4.3	32.0	42.9	33.1
255830.....	4.6	32.3	43.5	34.6
255830.....	4.5	30.1	44.7	33.7
255830.....	4.4	26.1	38.2	29.8
255830.....	4.3	30.0	43.2	33.2
255830.....	4.5	31.2	44.4	34.3
255830.....	4.3	28.3	42.4	32.4
256167.....	4.7	35.0	46.2	35.8
256167.....	4.5	30.8	42.6	32.9
256167.....	4.5	33.4	44.6	35.6
256167.....	4.6	33.0	44.3	34.3
256167.....	4.6	32.2	43.1	33.4

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
256167-----	4.5	29.0	40.1	32.1
256167-----	4.7	35.8	48.1	38.0
309382-----	4.9	33.8	44.8	35.2
309399-----	4.6	31.7	39.9	31.9
313561-----	4.6	34.7	44.5	34.9
313562-----	4.2	29.2	43.6	33.0
313563-----	4.8	35.7	47.7	38.0
313564-----	4.4	29.4	40.7	32.0
313564-----	4.5	33.1	44.9	34.5
313564-----	4.6	32.3	43.2	34.9
313564-----	4.8	34.3	45.2	35.5
313564-----	4.6	32.4	43.8	34.4
313564-----	4.5	30.3	44.3	34.3
313564-----	4.7	33.7	44.2	35.7
313564-----	4.6	34.6	41.6	33.2
313564-----	4.6	30.0	40.6	31.5
313564-----	4.9	30.8	39.3	31.3
313564-----	4.6	30.4	39.1	31.6
313565-----	4.7	34.3	46.4	35.8
313565-----	5.0	34.7	45.9	36.0
313565-----	4.4	30.1	44.1	34.4
313565-----	4.5	31.6	46.9	35.5
313565-----	4.4	31.2	43.0	33.2
313565-----	4.2	29.5	42.5	34.1
313565-----	4.6	34.7	46.3	35.8
313565-----	4.3	30.4	39.8	31.5
313565-----	4.6	29.8	38.6	30.6
313565-----	4.3	31.0	43.3	33.8
313565-----	4.8	31.7	42.6	33.2
313566-----	4.5	31.2	45.1	36.0
313566-----	4.4	28.4	39.2	30.8
313566-----	4.4	27.5	38.4	30.7
313566-----	4.8	27.8	36.7	29.3
313567-----	4.5	32.6	43.0	33.7
313567-----	4.6	32.5	48.3	37.5
313567-----	4.4	33.6	46.3	35.9
313567-----	4.6	31.0	41.2	33.0
313567-----	4.3	30.0	42.8	33.4
313567-----	4.6	32.1	45.6	35.9
313567-----	4.8	34.1	42.7	33.8
313567-----	4.4	30.5	42.8	33.3
313567-----	4.6	31.7	45.5	35.4
313567-----	4.9	33.8	42.3	33.2
Average-----	4.55	31.34	43.14	33.84
Greatest-----	5.00	35.8	48.6	38.0
Least-----	4.20	26.1	36.7	29.3

I am reproducing (pl. 94, figs. 4-7) Grateloup's figure and also figures of a perfect specimen from San Teodoro, Mindoro.

COCHLOSTYLA (CALOCOCHLEA) PERPALLIDA Bartsch

PLATE 94, FIGURES 8-10

1932. *Cochlostyla (Calocochlea) perpallida* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 335.

The nuclear whorls and the ground color of the postnuclear whorls are white. Where the periostracum remains there seems to be a basal film of straw color, upon which is superimposed a thin film of wood brown, which is variously spirally banded with darker brown. On the base these bandings become more emphasized. The interior of the aperture and the peristome are white. Nuclear whorls 2.1, well rounded, marked by incremental lines, and the last portion of the last turn by the beginning of fine spiral striations. The postnuclear whorls are strongly rounded and marked by fine incremental lines and fine, closely approximated, spiral striations, which are conspicuously developed on all the turns, as well as on the base. The summit of the whorls is appressed; the periphery feebly angulated; the base inflated and strongly rounded. The aperture is broadly oval, almost subcircular, oblique. The outer lip is moderately expanded and reflected; the inner lip is decidedly oblique and almost straight, the columellar side being somewhat excavated and covered by a thin white callus, which also extends over the parietal wall.

The type (U.S.N.M. no. 313568) was collected by Pedro de Mesa at Tabukala near San Teodoro, Mindoro. It has 4.6 whorls and measures: Length, 37.2 mm; greater diameter, 47 mm; lesser diameter, 35.3 mm.

This species strongly suggests *Cochlostyla (Calocochlea) melanocheila* in general size and the hydrophanous markings of the periostracum, but the ground color of the nuclear whorls, the aperture, and expanded peristome are white instead of dark. The aperture and columella also are more oblique. I am therefore inclined to believe that it is not merely a color phase of *melanocheila*.

COCHLOSTYLA (CALOCOCHLEA) AOPTA (Clench and Archer)

1933. *Helicostyla (Calocochlea) aopta* CLENCH and ARCHER, Papers Michigan Acad. Sci., Arts, Letters, vol. 17, p. 542, pl. 57, fig. 3.

"Shell imperforate, globose, rather solid. Nuclear whorl white, gradually shading off into darkish, dull yellow on the body whorl. From the nuclear whorl onward a brownish red subsutural band; from about one and one-half whorls from the nuclear whorl a reddish, gradually widening, gradually darkening band situated a short distance above the suture and continuing as a superperipheral band on the body whorl; a broad, brownish band on the body whorl just below the periphery. A brown circumcolumellar band present; aperture white; peristome and columella white; a slight hydrophanous cuticle appearing on the body whorl in the form of axial streaks cutting across the bands. Whorls 4, rounded, gradually increasing, and quite broad in back of the peristome; spire somewhat elevated; aperture broadly oblique and open; peristome rounded, moderately expanded and recurved; columella broad, slanting from the basicolumellar region

sharply inward toward the parietal wall; parietal callus extremely thin; suture moderately impressed. Sculpture consisting of crowded axial folds or lines, indistinct on the nuclear whorl, but gradually becoming plainer beyond that area."

The holotype (Mus. Comp. Zoöl. no. 81354) was collected between Puerto Galera and San Teodoro, Mindoro, by Pedro de Mesa. It measures: Altitude, 35.5 mm; diameter, 39.5 mm; aperture height, 21 mm; aperture width, 20 mm.

"This interesting new species is unfortunately represented by but a single specimen. It has hitherto been overlooked and may be quite rare. It bears a resemblance to several species from Luzon. It seems closest to *H. persimilis* Fér. It is a duller yellow with lighter bands and a narrower peristome, and is more depressed, having wider whorls."

As this species was described by Clench and Archer after our manuscript was turned in for publication, we are unable to include a figure of it in this paper.

COCHLOSTYLA (CALOCOCHLEA) ROISSYANA (Férussac)

Shell of medium size, helicoid, subglobular. The different subspecies vary materially in the color of the periostracum as well as in the color of the substance of the shell. In some both periostracum and shell are white; in others the periostracum is pale straw color, in others deeper yellow turning toward orange, while in still others it may be wood brown and almost black. The thickness of the periostracum is also decidedly variable. In some of the races it is thin, almost evanescent, while in others it is rather thick. The shell may be without bands; when this occurs, it is usually in the dark-colored forms, but even there banding is present in most specimens. In some races the banding is confined to a narrow zone on the summit of the whorls and the umbilical area, while in others a number of spiral bands are present between the summit and the umbilicus. The interior of the aperture in all the specimens before me is bluish white, even in the almost black individuals, and the peristome is edged with dark brown, although in one race, *C. (Calocochlea) roissyana cavitala*, from Mount Calavite, the dark peristome is less accentuated. Nuclear whorls about 2, slightly rounded, marked by fine incremental lines and on the last portion of the last turn by the beginning of spiral striations. The postnuclear whorls are strongly rounded, appressed at the summit, and marked by fine incremental lines and very fine spiral striations. The periphery is feebly obsoletely angulated. Base inflated, strongly rounded, and having the same sculpture as the spire. The aperture is subcircular, slightly oblique. The peristome is slightly expanded and reflected; the columella is rather stout and oblique and slightly excavated.

I am recognizing a number of subspecies or geographic races, which appear to have circumscribed habitats.

Hidalgo¹⁰ referred *Helix infuscata* Albers here as a subspecies. I do not agree with him on this point. It is not a member of the *Cochlostyla roissyana* complex; nor do I accept his references of this species occurring in the islands of Tablas, Leyte, and Mindanao. These evidently rest upon misidentifications.

KEY TO THE SUBSPECIES OF COCHLOSTYLA (CALOCOCHLEA) ROISSYANA

Shell with peripheral keel.....	monacha
Shell without peripheral keel.	
Shell dark brown.	
Shell with many bands.....	bartschi
Shell not with many bands.	
Outer lip very dark.....	subatra
Outer lip light.....	lutea
Shell not dark brown.	
Shell orange.....	lutea
Shell not orange.	
Shell of light ground color.	
Periostracum pale lemon.	
Dark spiral bands predominating over the light zones.	cavitala
Dark spiral bands not predominating over the light zones.	roissyana
Periostracum not pale lemon.	
Periostracum pale straw color.	
Band at the summit broad.....	manlaysa
Band at the summit narrow.....	laymansa

COCHLOSTYLA (CALOCOCHLEA) ROISSYANA MONACHA (Clench and Archer)

1933. *Helicostyla (Calocochlea) roissyana monacha* CLENCH and ARCHER, Papers Michigan Acad. Sci., Arts, Letters, vol. 17, p. 539, pl. 57, fig. 1.

"Shell imperforate, globose, rather solid. Nuclear whorl ivory-yellow, which continues onward to the edge of the peristome and becomes slightly tinged with brown. From the nuclear whorl onward a subsutural dark brown band, at first very narrow, but gradually widening; from the first whorl succeeding the nuclear whorl onward a supersutural dark brown band, at first very slight, but rather rapidly widening until it develops into a strong band above the periphery of the body whorl. Just below the periphery of the body whorl an ivory-yellow band covered most of the way by a thick cartridge-buff zone of hydrophanous cuticle; below the subperipheral yellow band a broad dark brown zone covering most of the base, but interrupted near the columella by another yellowish band, and inside that a dark brown circumcolumellar band. Body whorl suffused by a rather

¹⁰ Obras malacologicas, p. 464, 1901.

light hydrophanous cuticle ornamented by spiral lines at irregular distances from one another, these in turn being cut across by rather faint axial lines. As already mentioned, there is a subperipheral band of hydrophanous cuticle. Peristome blackish brown; columella white; aperture white; whorls 4, only slightly convex, body whorl keeled; spire rather flat; peristome narrow, rounded, slightly reflected, slightly recurved; columella broad, flat, and rather straight, slanting at 111° angle from the basal lip inward toward the parietal wall; parietal callus thin, aperture dome-shaped; suture very slightly impressed. Sculpture consisting of closely crowded axial striae, cut across by spiral lines, which are especially common below the periphery of the body whorl."

Holotype (Mus. Comp. Zoöl. no. 81353) collected at Binuañgan, Palúan, Mindoro, by Pedro de Mesa. It measures: Altitude, 33.5 mm; diameter, 39.5 mm; aperture height, 17.5 mm; aperture width, 16.5 mm.

"This species is readily distinguishable from *H. melanochila* by its keel and its higher spire. The stronger development of spiral lines is another difference. Its lighter color, especially on the spire, and scantier hydrophanous cuticle are other distinguishing characteristics. It also has a stronger columella. It is unique among the known *Helicostylae* of the section *Calocochlea* which occur in Mindoro in possessing a definite keel. The species is probably rare; only one specimen is known."

COCHLOSTYLA (CALOCOCHLEA) ROISSYANA BARTSCHI (Clench MS.) Bartsch

PLATE 95, FIGURES 10-12

1932. *Cochlostyla (Calocochlea) roissyana bartschi* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 335.
 1933. *Helicostyla (Calocochlea) roissyana bartschi* CLENCH and ARCHER, Papers Michigan Acad. Sci., Arts, Letters, vol. 17, p. 541, pl. 17, fig. 2.

Shell subglobular; the nuclear and early postnuclear whorls are flesh-color, gradually changing to brown. There is a narrow dark zone at the summit and another showing immediately posterior to the periphery. The periphery is pale buff, while the base is dark brown, with an obscure lighter median zone. The interior of the aperture and columella are bluish white, while the outer lip is dark. The entire shell is covered by a pale gray periostracum, which shows various hydrophanous spiral bands both on spire and base.

The 20 specimens of this race in our collection, collected by Pedro de Mesa at Anduyan, Paluan, Mindoro, are so uniform, both in general form and coloration, that I do not hesitate to consider this a good race. They yield the following measurements:

U.S.N.M. no.	Number of whorls	Height	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
313588-----	5. 2	31. 7	33. 4	28. 4
313588-----	5. 1	32. 7	33. 7	28. 4
313588-----	5. 0	28. 6	32. 5	27. 5
313588-----	5. 1	31. 2	34. 0	29. 2
313588-----	5. 2	33. 3	32. 2	27. 7
313588-----	5. 2	33. 8	35. 5	29. 6
313588-----	5. 3	32. 7	33. 3	29. 0
313588-----	5. 1	31. 4	32. 9	28. 5
313588-----	5. 1	29. 7	32. 5	27. 3
313588-----	5. 4	35. 9	33. 9	29. 6
313588-----	5. 1	32. 8	33. 5	28. 3
313588-----	5. 0	33. 2	34. 8	30. 5
313588-----	5. 1	31. 3	33. 1	28. 6
313588-----	5. 2	33. 5	33. 3	29. 3
313588-----	5. 4	31. 8	31. 7	27. 1
313588-----	5. 3	34. 2	34. 2	29. 7
313588-----	5. 1	29. 5	33. 0	27. 8
313588-----	5. 2	30. 9	32. 8	27. 4
313588-----	5. 6	35. 5	32. 3	28. 2
313588-----	5. 4	34. 8	33. 6	29. 9
Average-----	5. 2	32. 42	33. 31	28. 6
Greatest-----	5. 6	35. 9	35. 5	30. 5
Least-----	5. 0	28. 6	31. 7	27. 1

COCHLOSTYLA (CALOCOCHLEA) ROISSYANA SUBATRA Pilsbry

PLATE 95, FIGURES 7-9

1841. *Helix roissyana* var. *d* SOWERBY, Proc. Zool. Soc. London, 1840, pp. 101-102; in part.
1846. *Helix roissyana* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, ed. 2, vol. 1, Abt. 12, Theil 2, pp. 283-284 (in part), pl. 47, fig. 3.
1851. *Helix roissyana* REEVE, Conchologia iconica, pl. 18, figs. 73b, 73c.
1887. *Cochlostyla roissyana* HIDALGO, Journ. Conchyl., vol. 35, p. 146; in part.
1892. *Cochlostyla roissyana subatra* PILSBRY, Man. Conch., ser. 2, vol. 6, p. 152, pl. 30, fig. 28.
1895. *Helicostyla roissyana subatra* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 223.
1898. *Cochlostyla roissyana cuticulare* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 122.
1898. *Cochlostyla roissyana subatra* MÖLLENDORFF, *ibid.*, p. 122.
1901. *Cochlostyla roissyana* var. *o* HIDALGO, Obras malacologicas, p. 466, pl. 51, fig. 2.
1910. *Cochlostyla roissyana subatra* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 204-205 (in part), pl. 42, fig. 3.
1910. *Cochlostyla roissyana cuticulare* MÖLLENDORFF, KOBELT, and WINTER, *ibid.*, pp. 204-205 (in part), pl. 42, fig. 4.
1932. *Cochlostyla (Calocochlea) roissyana subatra* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 335.
1933. *Helicostyla (Calocochlea) roissyana cuticularis* CLENCH and ARCHER, Papers Michigan Acad. Sci., Arts, Letters, vol. 17, p. 541.

Shell varying from decidedly subglobular to elevated helicoid. The nuclear whorls may be dark or light, and the coloration varies from dark brown to orange. The postnuclear whorl is usually light, with

a zone of brown at the summit and frequently a narrow line of brown showing above the suture. Both of these brown lines as a rule gradually increase in width until they entirely blot out the light zone between them. The base is usually unicolor, although sometimes the umbilical area, which is dark, is bordered by a little paler zone posteriorly. The interior of the aperture is bluish white, and the outer lip is brown; the columellar area though white is occasionally tinged with brown. When the periostracum is present this is usually of a dull wood-brown color, sometimes faintly spirally lined.

I have two shells before me that are pale orange and suggest in their color scheme the orange form from Jlin Island, but in shape they conform more with *subatra*. There is no definite locality mentioned. A series of 38 specimens yields the following measurements:

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
313618.....	4.7	29.1	33.0	27.9
313593.....	4.9	30.0	35.1	30.4
313593.....	5.2	30.6	34.6	29.7
313593.....	5.1	32.0	32.8	28.4
313593.....	4.8	32.3	36.0	30.3
195433.....	5.1	30.4	31.1	27.4
195433.....	5.0	27.4	29.8	25.9
103953.....	4.9	29.2	34.3	28.7
309480.....	5.0	30.0	30.4	26.1
309480.....	5.0	28.4	28.5	24.7
309480.....	5.1	31.0	30.6	26.8
20413.....	5.2	35.2	35.3	30.6
20414.....	4.9	31.3	32.6	27.7
7594.....	5.3	34.1	34.4	29.3
7594.....	5.1	32.7	34.4	29.7
7594.....	4.9	30.6	33.0	27.8
105270.....	5.1	27.3	28.1	24.1
43521.....	5.1	28.2	28.8	25.5
104376.....	5.2	32.7	32.8	28.0
99902.....	5.0	32.0	32.0	27.1
106367.....	4.6	25.9	29.7	24.5
103953.....	5.4	33.7	34.8	30.9
106366.....	5.3	32.2	32.3	29.2
21835.....	5.3	28.3	31.2	25.9
315750.....	4.6	28.8	30.0	26.9
1272.....	5.0	30.2	32.3	28.3
1272.....	4.7	27.4	29.1	25.6
20418.....	4.7	27.2	31.0	26.7
20418.....	5.4	31.3	32.7	28.3
20418.....	5.1	29.8	32.5	27.8
99895.....	5.0	27.0	30.0	24.9
31752.....	5.0	32.1	34.8	28.7
99902.....	5.0	28.4	31.1	26.7
99902.....	4.9	27.7	30.2	26.0
105283.....	5.2	28.1	29.9	26.1
105283.....	5.0	26.2	31.7	27.1
315749.....	4.9	32.3	37.1	31.5
20414.....	5.0	32.2	34.6	29.8
Average.....	5.02	30.09	32.17	27.66
Greatest.....	5.4	35.2	37.1	31.5
Least.....	4.6	25.9	28.1	24.1

The present race can be distinguished from the dark race from Ilin Island by its larger size and dark lip.

COCHLOSTYLA (CALOCOCHLEA) ROISSYANA LUTEA (Pfeiffer)

PLATE 95, FIGURES 1-6

1869. *Helix roissyana* var. PFEIFFER, Novitates conchologicae, vol. 3, p. 497, pl. 107, figs. 10, 11.
 1876. *Helix roissyana lutea* PFEIFFER, Monographia heliceorum viventium, vol. 7, p. 324.
 1892. *Cochlostyla roissyana lutea* PILSBRY, Man. Conch., ser. 2, vol. 6, p. 152, pl. 30, figs. 23, 24.
 1895. *Helicostyla roissyana lutea* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 223.
 1899. *Cochlostyla roissyana lutea* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 122.
 1901. *Cochlostyla roissyana* var. *c* HIDALGO, Obras malacologicas, pt. 1, p. 465.
 1901. *Cochlostyla roissyana* var. *m* HIDALGO, *ibid.*, p. 466, pl. 122, fig. 2.
 1910. *Cochlostyla roissyana lutea* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 204-205; in part.
 1932. *Cochlostyla* (*Calocochlea*) *roissyana lutea* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 335.

Ilin Island has a small race of *Cochlostyla* (*Calocochlea*) *roissyana*. Quadras was the first one to point out that the yellow shell that Pfeiffer described and figured in 1869 in his Novitates Conchologicae came from Ilin Island. Four specimens before me, which undoubtedly belong here, agree quite well with Pfeiffer's diagnosis, and they agree so well with the host of material before me in shape, although this is of extremely dark coloration, that I am led to believe that they probably represent only color phases of the Ilin Island race. I am therefore giving a description of both. The typical *Cochlostyla* (*Calocochlea*) *roissyana lutea* figured by Pfeiffer is of orange color with a light band a little distance below the summit, which bears a dark band. Beginning with the next to the last whorl, the light zone more and more covers the whorls until only a narrow suprasutural band and a narrow zone of orange are present at the summit. The base is also of orange color, with the columella and expanded peristome light edged with an orange margin at the outer periphery. The dark shells may be described as follows:

Shell small, globular; nuclear whorls bluish white, the first postnuclear turn soiled flesh-color, the rest brown, usually with an inconspicuous broad median paler brown zone. Base brown. The entire surface is covered by a dull pale grayish brown periostracum. The interior of the aperture and columella are white; the peristome is edged with dark brown. A light zone bordering the dark columellar patch is seen on the parietal wall within the aperture.

The specimens before me were collected by Pedro de Mesa on Ilin Island, south of Mindoro.

The specimens yield the following measurements:

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
106363-----	4.8	25.9	28.8	24.6
106363-----	4.8	25.4	29.2	24.3
106363-----	4.5	27.0	29.1	24.4
106363-----	4.7	25.5	28.9	24.2
313594-----	4.9	27.3	29.8	25.2
313594-----	5.0	27.1	29.4	25.5
313594-----	4.5	25.0	28.6	25.5
313594-----	4.6	21.3	25.7	21.3
313594-----	4.5	26.0	29.0	24.7
313594-----	4.9	26.8	28.2	24.8
313594-----	4.7	24.3	29.5	25.2
313594-----	4.5	27.0	30.0	25.1
313594-----	4.5	24.5	28.0	23.8
313594-----	4.6	27.2	31.1	26.1
313594-----	4.9	26.6	30.0	25.0
313594-----	4.6	27.8	33.0	27.5
313594-----	5.0	27.0	29.1	25.6
313595-----	4.5	22.2	26.8	22.8
313595-----	4.9	28.5	29.8	26.0
313595-----	4.6	25.9	30.6	25.5
313595-----	5.0	26.6	30.5	26.0
313595-----	5.0	28.8	30.4	26.8
313595-----	4.9	26.3	31.0	25.7
309427-----	4.6	23.3	27.2	23.4
Average-----	4.7	25.97	29.3	24.9
Greatest-----	5.0	28.8	33.0	27.5
Least-----	4.5	21.3	25.7	21.3

This race is easily distinguished from the other dark-colored forms by its smaller size. The dark Ilin Island shells are differentiated from those of Mindoro by having the peristome of the outer lip paler, in most instances white or merely edged with brown, while in the Mindoro shells the outer lip is dark.

COCHLOSTYLA (CALOCOCHLEA) ROISSYANA CAVITALA Bartsch

PLATE 96, FIGURES 10-12

1932. *Cochlostyla (Calocochlea) roissyana cavitala* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 336.

Shell large, subglobular. The nuclear whorls when perfect are covered with a thin olivaceous periostracum. The nuclear whorls and the early postnuclear whorls are flesh-color, with a zone of black near the summit and immediately posterior to the periphery. These zones increase rapidly in size but always maintain between them a broad band of flesh-color. A narrow zone of flesh-color is present on the periphery and still another at the middle of the base. The latter is frequently tinged with brown or reddish brown, the rest of the base being like the bands of the spire, very dark brown. The aperture is bluish white showing the dark bands within. The columella is soiled white, while the outer lip is dark.

The type (U.S.N.M. no. 313589) was collected by Pedro de Mesa at Mount Calavite, Paluan, Mindoro. It has 5.3 whorls and measures: Length, 37.2 mm; greater diameter, 36.5 mm; lesser diameter, 32.2 mm.

Thirteen topotypes (U.S.N.M. no. 313590) from the same source yield the following additional measurements:

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
313590-----	5.1	31.4	28.8	25.8
313590-----	5.1	34.3	33.9	29.3
313590-----	5.5	33.2	33.2	28.1
313590-----	5.2	33.5	33.3	28.9
313590-----	5.1	30.6	30.7	26.9
313590-----	5.0	31.0	29.2	25.8
313590-----	4.9	31.3	34.7	29.4
313590-----	5.0	34.2	34.9	29.0
313590-----	5.2	31.7	32.2	27.3
313590-----	5.1	34.9	34.2	29.3
313590-----	5.0	32.3	34.6	29.4
313590-----	5.2	33.5	34.8	30.2
313590-----	4.9	28.0	31.7	26.9

U.S.N.M. no. 313591 contains nine specimens from Calawagan, northeastern Mindoro, which in part agree with the present race and in part tend toward the dark-colored *Cochlostyla (Calocochlea) subatra*. I am placing them provisionally here. They yield the following measurements:

313591-----	5.2	29.8	31.2	27.0
313591-----	5.6	36.1	33.8	30.8
313591-----	5.4	35.1	35.2	30.8
313591-----	5.0	32.2	31.0	28.9
313591-----	5.4	34.0	33.2	29.5
313591-----	5.4	34.2	32.3	28.8
313591-----	5.3	33.5	33.2	29.8
313591-----	5.4	41.0	37.7	32.4
313591-----	5.2	35.6	34.8	30.6
Average-----	5.2	33.24	33.11	28.86
Greatest-----	5.6	41.0	37.7	32.4
Least-----	5.0	28.0	28.8	25.8

This race differs from *C. (C.) roissyana bartschi* in being uniformly lighter colored.

COCHLOSTYLA (CALOCOCHLEA) ROISSYANA ROISSYANA (Férussac)

PLATE 96, FIGURES 7-9

1822. *Helix roissyana* FÉRUSAC, Tableaux systématiques des animaux mollusques . . . , p. 47; a nomen nudum and manuscript name.
1830. *Helix roissyana* DESHAYES, Encyclopédie méthodique, vol. 2, p. 265.
1837. *Helicostyla roissyana* BECK, Index molluscorum praesentis aevi musei principis augustissimi Christiani Frederici, p. 37.

1841. *Helix roissyana* SOWERBY, Proc. Zool. Soc. London, 1840, pp. 101-102; in part.
1848. *Helix roissyana* PFEIFFER, Monographia heliceorum viventium, vol. 1, p. 249.
1849. *Helix roissyana* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, ed. 2, vol. 1, Abt. 12, Theil 1, pp. 283-284 (in part), pl. 47, figs. 1, 2.
1850. *Helicostyla roissyana* ALBERS, Die Heliceen, ed. 1, p. 104.
1850. *Helix roissyana* DESHAYES, Férussac's Histoire naturelle . . . mollusques . . . , vol. 1, pp. 297-298, pl. 104, figs. 2, 3; pl. 107, figs. 11-13.
1851. *Helix roissyana* REEVE, Conchologia iconica, pl. 18, text; in part.
1853. *Helix roissyana* PFEIFFER, Monographia heliceorum viventium, vol. 3, p. 187.
1855. *Helicostyla roissyana* H. and A. ADAMS, The genera of recent Mollusca, vol. 2, p. 192.
1856. *Helix (Callicochlias) roissyana* PFEIFFER, Malakozool. Blätter, vol. 2, p. 143.
1859. *Helix roissyana* PFEIFFER, Monographia heliceorum viventium, vol. 4, p. 209.
1860. *Helicostyla roissyana* MARTENS, Albers, Die Heliceen, ed. 2, p. 175.
1868. *Helix roissyana* PFEIFFER, Monographia heliceorum viventium, vol. 5, p. 281.
1876. *Helix roissyana* PFEIFFER, Monographia heliceorum viventium, vol. 7, p. 324.
1877. *Cochlostyla roissyana* SEMPER, Reisen im Archipel der Philippinen, pt. 2, vol. 3, p. 185.
1887. *Cochlostyla roissyana* HIDALGO, Journ. Conchyl., vol. 35, pp. 146-147; in part.
1892. *Cochlostyla roissyana* PILSBRY, Man. Conch., ser. 2, vol. 7, pp. 151-152, pl. 30, figs. 25-27.
1895. *Helicostyla roissyana* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 223.
1896. *Cochlostyla roissyana* ELERA, Catalogo sistematico de toda la fauna de Filipinas, vol. 3, p. 576; in part.
1897. *Cochlostyla roissyana* HIDALGO, Journ. Conchyl., vol. 44, pp. 252, 254, 258, 300, 312, 313, 316, 318, 334, 335, 341, 351.
1898. *Cochlostyla roissyana* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 122.
1901. *Cochlostyla roissyana* HIDALGO, Obras malacologicas, p. 465 (in part), pl. 50 fig. 3; pl. 51, figs. 3-6; pl. 122, fig. 3.
1910. *Cochlostyla roissyana* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 204-205 (in part), pl. 42, figs. 1, 2.
1932. *Cochlostyla (Calocochlea) roissyana roissyana* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 335.
1933. *Helicostyla (Calocochlea) roissyana* CLENCH and ARCHER, Papers Michigan Acad. Sci., Arts, Letters, vol. 17, p. 540.

Shell varying from subglobose to helicoid in shape. The early whorls are of a little paler ground color than the later, which are covered with a pale-yellow periostracum. In the specimen figured by Férussac (pl. 104, figs. 2 and 3) there is a brown zone at the summit of the postnuclear turns, a narrow brown zone at the periphery, and a dark zone about the umbilicus. The outer lip is also dark. At variance with this we have specimens without the peripheral brown band and others in which the peripheral brown band is much broader

than in the specimen figured, and still others in which there is a broad basal dark brown band about halfway between the peripheral zone and the dark area about the columella. Our plate 96, figure 8, illustrates this. The columella in all our specimens is white, sometimes with a pinkish tinge. Most of our material was collected by Worcester and Bourns on the Menage Expedition.

While our specimens bear numbers, we do not have the data going therewith, but we know that Worcester and Bourns collected about Calapan and Naujan; in other words, in northeastern Mindoro.

A series of 40 specimens yields the following data:

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
106367.....	4.9	28.3	29.5	25.8
313623.....	5.0	34.0	34.0	29.8
130822.....	4.9	28.8	22.1	27.8
313611.....	4.9	27.9	29.9	26.0
313611.....	4.9	30.1	32.8	26.3
313611.....	4.9	26.0	32.9	27.0
313611.....	5.0	30.3	31.3	26.0
313611.....	4.9	28.4	32.1	27.8
313611.....	4.5	28.4	33.2	28.2
313612.....	5.1	30.2	30.4	26.8
313612.....	4.8	26.5	29.6	24.9
313612.....	4.4	27.2	29.3	25.2
313612.....	4.7	26.5	30.2	25.7
313612.....	4.6	24.6	29.9	26.3
313612.....	4.4	25.2	31.9	27.3
313612.....	5.0	24.9	29.4	25.1
313612.....	4.5	25.0	29.7	24.8
313612.....	4.6	26.8	32.0	26.5
313612.....	4.8	24.6	28.4	24.7
313612.....	4.7	27.3	28.9	25.5
313612.....	4.6	26.0	30.2	25.7
313612.....	4.7	26.2	29.0	24.5
313612.....	4.7	26.0	30.4	26.5
313612.....	4.8	27.1	31.5	26.8
313612.....	4.6	25.0	30.2	25.7
313612.....	4.7	27.0	31.2	25.8
313612.....	4.6	27.7	31.6	26.8
313612.....	4.6	26.5	30.2	25.5
313612.....	4.7	25.5	28.8	24.9
313612.....	5.0	29.8	31.8	27.7
313612.....	4.6	27.4	32.3	27.5
313612.....	4.6	27.5	31.2	27.0
313612.....	4.6	27.5	33.1	27.8
313612.....	4.7	29.0	31.6	27.6
313612.....	4.7	28.0	30.5	26.0
313612.....	4.6	27.3	29.0	25.6
106365.....	5.0	25.8	28.1	23.9
106365.....	4.7	28.6	31.3	27.5
313613.....	4.9	27.5	29.3	26.0
106364.....	4.8	27.5	29.8	26.7
Average.....	4.74	27.35	30.46	26.32
Greatest.....	5.1	34.0	34.0	29.8
Least.....	4.4	24.6	22.1	23.9

The yellow periostracum distinguishes this, the typical race, from the rest.

COCHLOSTYLA (CALOCOCHLEA) ROISSYANA MANLAYSA Bartsch

PLATE 96, FIGURES 1-3

1901. *Cochlostyla roissyana* var. *e* HIDALGO, Obras malacologicas, p. 465, pl. 51, fig. 7.

1932. *Cochlostyla (Calocochlea) roissyana manlaysa* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 336.

Shell subglobular, with the periostracum almost white, sometimes with a little pinkish tinge. A zone of brown marks the summit of the whorls, and another, usually narrow, may be present immediately above the periphery, or this may be absent. There is always a dark-brown area about the umbilicus and usually a broad band of brown midway between the peripheral zone and the dark umbilical area. The outer lip is dark.

This race is distinguished chiefly from typical *roissyana* by its much paler color. I collected a series of specimens on the east shore of Mansalay Bay, Mindoro.

The type (U.S.N.M. no. 313614) has 5 whorls and measures: Length, 31.6 mm; greater diameter, 34.7 mm; lesser diameter, 29.8 mm.

U.S.N.M. no. 255928 contains a number of topotypes, which yield the following measurements:

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
255928-----	5. 0	31. 7	33. 9	29. 4
255928-----	4. 9	27. 4	31. 8	27. 9
255928-----	4. 9	27. 4	32. 7	28. 3
255928-----	4. 8	28. 1	32. 7	28. 5
255928-----	5. 0	29. 7	31. 7	28. 3
255928-----	4. 6	24. 0	30. 7	25. 6

Additional specimens yield the following measurements:

99903-----	4. 8	29. 8	32. 3	28. 3
99903-----	4. 8	28. 6	32. 8	28. 1
309468-----	4. 7	27. 8	31. 5	26. 3
313615-----	4. 7	29. 2	34. 8	28. 8
99894-----	4. 7	29. 0	32. 9	28. 9
20416-----	4. 8	30. 7	34. 3	29. 9
7594a-----	5. 2	30. 4	31. 2	28. 3
7594a-----	5. 0	28. 6	29. 2	25. 8
7594a-----	4. 8	28. 3	31. 5	27. 5
20416-----	5. 1	31. 0	32. 0	28. 0
20417-----	5. 3	30. 7	31. 2	27. 4
Average-----	4. 89	28. 9	32. 2	27. 9
Greatest-----	5. 3	31. 7	34. 8	29. 9
Least-----	4. 6	24. 0	29. 2	25. 6

COCHLOSTYLA (CALOCOCHLEA) ROISSYANA LAYMANSA Bartsch

PLATE 96, FIGURES 4-6

1851. *Helix roissyana* REEVE, *Conchologia iconica*, pl. 18, fig. 73a.
 1887. *Cochlostyla roissyana* HIDALGO, *Journ. Conchyl.*, vol. 35, p. 146; in part.
 1896. *Cochlostyla roissyana* var. *ELERA*, *Catalogo sistematico de toda la fauna de Filipinas*, vol. 3, p. 576.
 1901. *Cochlostyla roissyana* var. *d* HIDALGO, *Obras malacologicas*, p. 465, pl. 51, fig. 1; pl. 122, fig. 4?
 1932. *Cochlostyla (Calocochlea) roissyana laymansa* BARTSCH, *Journ. Washington Acad. Sci.*, vol. 22, p. 336.

Shell rather small, globular, covered with a thin periostracum, which is the color of the blush of a green plum. In all our specimens there is a zone of brown at the summit and a dark area about the umbilicus. In addition to that there may be a supraperipheral band and a band between the periphery and the base. In some of the specimens the last whorl becomes gradually brown toward the aperture. In such there is usually a zone of the ground color at the periphery.

The type (U.S.N.M. no. 313616) has 5.1 whorls and measures: Length, 30.8 mm; greater diameter, 31.1 mm; lesser diameter, 26.7 mm.

U.S.N.M. no. 255958 contains 17 topotypes, the perfect specimens of which measure:

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
255958.....	4.8	29.5	33.2	27.7
255958.....	4.8	28.8	30.9	26.8
255958.....	5.0	27.1	32.0	26.7
255958.....	4.6	26.6	31.7	26.5
255958.....	4.7	26.4	32.4	26.3
255958.....	4.7	26.4	30.7	25.5
255958.....	4.7	28.5	32.7	26.7
255958.....	4.8	29.3	31.9	26.8
255958.....	4.8	27.1	31.0	26.2
255958.....	5.0	27.5	28.7	25.2
255958.....	4.8	27.8	32.8	27.1
255958.....	4.9	26.5	28.7	24.8
255958.....	4.6	26.9	30.3	25.2
255958.....	5.0	26.0	28.8	24.1
255958.....	4.6	27.7	31.6	26.5
255958.....	4.7	28.9	34.0	28.0
255958.....	4.8	27.4	30.3	25.6
Average.....	4.78	27.55	31.28	26.22
Greatest.....	5.0	29.5	34.0	28.0
Least.....	4.6	26.0	28.7	24.1

This race coming from the western shore of Mansalay Bay can easily be distinguished from the others by its pale greenish plum color.

COCHLOSTYLA (CALOCOCHLEA) GERTRUDIS Möllendorff, Kobelt, and Winter

PLATE 97, FIGURES 1-3

1853. *Helix solida* PFEIFFER, Proc. Zool. Soc. London, 1851, p. 263; not *Bulimus solidus* Pfeiffer, Proc. Zool. Soc. London, 1842, p. 152.
1901. *Cochlostyla roissyana solida* HIDALGO, Obras malacologicas, pt. 1, pp. 463-466; in part.
1901. *Cochlostyla roissyana* var. *g* HIDALGO, *ibid.*, p. 466.
1910. *Cochlostyla gertrudis* MÖLLENDORFF, KOBELT, and WINTER. Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 205-206 (in part), pl. 42, fig. 5.
1932. *Cochlostyla (Calocochlea) gertrudis* BARTSCH, Journ. Washington Acad. Sci. vol. 22, p. 336.

Shell helicoid. The early whorls are buff with a pinkish tinge; the later turns, becoming increasingly darker, finally brown. The ground color, however, when the periostracum is removed, is yellowish olivaceous-buff. The interior of the aperture and columella are white, while the outer lip is tinged with pale brown. Nuclear whorls 1.7, depressed, moderately rounded, and marked by incremental lines, the last half of the last whorl being rather rough. The postnuclear whorls are moderately well rounded, the first one fairly smooth and marked by incremental lines and fine spiral striations. The succeeding turn is marked by obsolete riblike axially slanting threads, which become weaker on the last turn and more closely approximated. These whorls also show microscopic spiral striations. The periphery is feebly angulated; base moderately rounded and marked by thread-like axial riblets and spiral lines. The aperture is broadly oval, oblique; the outer lip is very slightly expanded and reflected; columella broad, somewhat excavated, and oblique.

The specimen described and figured (U.S.N.M. no. 201040) was collected by Quadras at Santa Maliyboy, Bongabon, Mindoro. It has 5 whorls and measures: Length, 28.8 mm; greater diameter, 36.7 mm; lesser diameter, 30.1 mm.

Another specimen (U.S.N.M. no. 255973), from Mansalay Bay, Mindoro, collected by myself, has 4.8 whorls and measures: Length, 25.8 mm; greater diameter, 34.2 mm; lesser diameter, 28.1 mm.

Pfeiffer, in 1843,¹¹ described *Bulimus solidus* from San Juan, Cagayan, Province of Luzon, which is a *Cochlostyla*. Later, in 1853,¹² he described *Helix solida*, which is likewise a *Cochlostyla*. This second name, therefore, has to be suppressed, and this was done in 1910 by Möllendorff, Kobelt, and Winter¹³ who rechristened the shell *Cochlostyla gertrudis*, the name here applied.

In a general way this shell recalls *Cochlostyla roissyana*, but it is more depressed and more helicoid and lacks the dark columellar area so characteristic of that species.

¹¹ Proc. Zool. Soc. London for 1842, p. 152, 1843.

¹² Proc. Zool. Soc. London for 1851, p. 263, 1853.

¹³ Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 205-206, 1910.

Subgenus HALOCOCHLEA Bartsch

1932. *Halocochlea* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 336.

In this subgenus the shell is helicoid. The periphery is angulated. The last whorl slopes almost at the same angle posteriorly and basally from the periphery. The outer lip is slightly expanded and reflected, and the columella is very oblique and excavated. There is scarcely any calcareous material in the shell, which is thin and diaphanous.

Type: *Cochlostyla* (*Halocochlea*) *lillianae* Bartsch.

COCHLOSTYLA (HALOCOCHLEA) LILLIANAE Bartsch

PLATE 97, FIGURES 4-6

1932. *Cochlostyla* (*Halocochlea*) *lillianae* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 336.

The shell is exceedingly thin, in fact so thin that by transmitted light one is able to see all the internal structure, including the columella, as plainly as if one were looking through a piece of thin greenish glass. The nuclear whorls are white, and the postnuclear whorls very pale yellowish olive-green. There is a dark chestnut-brown columellar area, which contrasts markedly with the green base and the white of the columellar area. The reflected outer lip is pale green, while the interior of the aperture is pearly gray. There is also a very slender brown thread separated by a space about as wide as a thread from the summit of the turn on the last whorl. Nuclear whorls 2, well rounded, smooth. The postnuclear whorls are somewhat inflated, strongly rounded, marked by fine incremental lines, which have an almost threadlike appearance, and numerous, closely spaced, microscopic spiral striations on both spire and base. The aperture is almost circular; the suture is slightly impressed and the periphery obsoletely angulated. The base is moderately long and strongly rounded.

The type (U.S.N.M. no. 255825), collected by Col. Edgar A. Mearns on Mount Halcon, has 4.2 whorls and measures: Length, 27.7 mm; greater diameter, 28.3 mm; lesser diameter, 23.7 mm.

I have taken great pleasure in naming this species for Miss Lillian Mearns, daughter of the collector. It is one of the most exquisite species known from the Philippine Islands, and the type at the present time constitutes the only known specimen.

Subgenus HELICOSTYLA Férussac

In this subgenus the shell varies from ovate to elongate-ovate. The apex is blunt and the base expanded and usually conspicuously differentiated from the spire by color markings. A thin deliscent peristracum is present. The outer lip is somewhat expanded and reflected, and the columella slightly excavated.

Type: *Cochlostyla (Helicostyla) mirabilis* (Férussac).

I am placing two of the Mindoro Province species here, namely, *Cochlostyla (Helicostyla) fulgens* (Sowerby) and *C. (H.) dimera* (Jonas).

COCHLOSTYLA (HELICOSTYLA) FULGENS (Sowerby)

Shell varying in shape from broadly ovate to elongate-ovate, imperforate, the spire with a blunt apex. In the various races before me the ground color of the postnuclear whorls is milk-white; that of the nuclear turns in the fresh state is translucent pale horn color. The spire is covered with a thin, scarcely perceptible film of periostracum, while the base is much more provided with this element. In fact, the base appears as if covered with a heavy coat of varnish. The postnuclear whorls are variously banded with chestnut-brown or almost blackish brown; sometimes a combination of these colors is present on the same shell. In most of our specimens there is but a single band on the spire; in some, however, we have a brown zone near the summit and two or three anterior to this. The base is by far the more variably marked portion of the shell. The columellar area is always dark, and in addition to this there may be one, two, or three bands of varying width present, or these bands may become fused to form a completely dark base or there may be a zone or two of light color. The interior of the aperture is white, frequently showing the dark spiral bands of the outside within. These bands appear to belong to the very substance of the shell. The peristome is white. Nuclear whorls about 1.5, forming an almost flattened apex. The succeeding turns are somewhat inflated and strongly rounded. The periphery is well rounded, and the base is rather short, inflated, and well rounded. The postnuclear whorls are marked by retractively curved, fine microscopic lines of growth and microscopic spiral striations.

The aperture is oblique, almost subcircular; the outer lip moderately expanded and reflected. The columella is broad, widest in the middle. The parietal wall is covered by a thin, translucent callus.

This species appears to be confined to the northern and eastern portion of Mindoro. It seems to break up into several races, which may be distinguished by the following key:

KEY TO THE SUBSPECIES OF COCHLOSTYLA (HELICOSTYLA) FULGENS

Base covered by a thick olivaceous-yellow periostracum.

Shell broadly ovate..... *fulgens*

Shell elongate-ovate..... *johnsoni*

Base not covered by a thick olivaceous-yellow periostracum.

Base covered by a thin yellow periostracum..... *sapolana*

COCHLOSTYLA (HELICOSTYLA) FULGENS FULGENS (Sowerby)

PLATE 98, FIGURES 4-12

1841. *Helix fulgens* SOWERBY, Proc. Zool. Soc. London, 1841, p. 3.
 1842. *Helix fulgens* PFEIFFER, Symbolae, vol. 2, p. 28.
 1848. *Helix fulgens* PFEIFFER, Monographia heliceorum viventium, vol. 1, p. 221.
 1849. *Helix fulgens* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, ed. 2, vol. 1, Abt. 12, Theil 1, pp. 287-288, pl. 48, figs. 3, 4.
 1850. *Helicostyla fulgens* ALBERS, Die Heliceen, ed. 1, p. 104.
 1851. *Helix fulgens* REEVE, Conchologia iconica, pl. 7, figs. 31a, 31b.
 1851. *Helix fulgens* DESHAYES, Férussac's Histoire naturelle . . . mollusques . . ., vol. 1, pp. 318-319, pl. 108, figs. 1, 2, 9, 10.
 1853. *Helix fulgens* PFEIFFER, Monographia heliceorum viventium, vol. 3, p. 172.
 1855. *Helicostyla fulgens* H. and A. ADAMS, The genera of recent Mollusca, vol. 2, p. 192.
 1856. *Helix (Helicostyla) fulgens* PFEIFFER, Malakozool. Blätter, vol. 2, p. 145.
 1859. *Helix fulgens* PFEIFFER, Monographia heliceorum viventium, vol. 4, p. 206.
 1860. *Helicostyla fulgens* MARTENS, Albers, Die Heliceen, ed. 2, p. 175.
 1868. *Helix fulgens* PFEIFFER, Monographia heliceorum viventium, vol. 5, p. 274.
 1887. *Cochlostyla fulgens* HIDALGO, Journ. Conchyl., vol. 35, p. 145.
 1892. *Cochlostyla mirabilis fulgens* PILSBRY, Man. Conch., ser. 2, vol. 7, pp. 182-183.
 1895. *Helicostyla mirabilis fulgens* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 224.
 1896. *Cochlostyla fulgens* ELERA, Catalogo sistematico de toda la fauna de Filipinas, vol. 3, p. 586.
 1897. *Cochlostyla fulgens* HIDALGO, Journ. Conchyl., vol. 44, pp. 258, 284, 331, 341, 351.
 1898. *Cochlostyla fulgens* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 113.
 1901. *Cochlostyla fulgens* HIDALGO, Obras malacologicas, pp. 453-455 (in part), pl. 36, fig. 5; pl. 50, fig. 5; pl. 95, fig. 1; pl. 132, fig. 6.
 1909. *Cochlostyla fulgens* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, p. 153, pl. 30, fig. 7.
 1932. *Cochlostyla (Helicostyla) fulgens fulgens* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 336.
 1933. *Helicostyla (Helicostyla) fulgens* CLENCH and ARCHER, Papers Michigan Acad. Sci., Arts, Letters, vol. 17, p. 543.

Shell broadly ovate, rather solid, ground color milk-white, the spire being usually covered with the merest indication of a film of periostracum, while the basal portion is much more strongly provided with this element, which here forms a thick olivaceous-yellow coating. In addition to this there are various spiral bands varying in color from bright chestnut-brown to brownish black. These differ in number both on spire and base. In most instances we have a single broad band, almost median between summit and spire, which begins on an early whorl as a slender bright chestnut-colored line and gradually becomes intensified in coloration until it may be almost black. This band is frequently flanked with a narrower one posterior to it. Sometimes the two are both broad and separated by a mere lighter line; sometimes, too, there is a broad band of brown immediately below the summit of the shell. The base is far more variable in its ornamentation than the spire. It

always has the columellar area dark, and in addition some of the specimens before me, apparently from the same locality, may show a single band of brown, while in others two or three bands may be present, and in some instances the entire base may be dark or relieved by a lighter zone. These basal bands vary materially in width and spacing, as well as in color, for some are dark, almost blackish brown, while in others the chestnut element prevails or a mixture of the two may be present. The aperture is bluish white within, which is also the color of the expanded and reflected peristome. Nuclear whorls 1.5, well rounded, smooth. The postnuclear whorls are strongly rounded, appressed at the summit, and marked by slender, retractively slanting, axial lines of growth and also by very fine microscopic spiral striations. This sculpture is present on both spire and base. The aperture is broadly ovate, oblique; the peristome is slightly expanded and reflected, a little broader on the insertion of the inner lip where it is somewhat excavated.

The specimen described and figured (U.S.N.M. no. 255822a) agrees best with the figure published by Pfeiffer in Martini-Chemnitz. It was collected by Col. Edgar A. Mearns on the Mount Halcon Expedition, probably somewhere in the environs of Calapan. It has 5 whorls and measures: Length, 33.9 mm; greater diameter, 28.5 mm.

A series of additional specimens from the same locality yields the following data:

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter	Locality
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>	
255822-----	5.1	31.8	31.4	26.8	
255822-----	4.9	30.9	31.4	27.3	
255822-----	4.7	29.6	29.3	25.3	
255822-----	4.5	28.9	31.0	26.8	
255822-----	4.6	29.3	29.8	25.4	
255822-----	4.9	33.6	29.9	24.7	
255822-----	4.8	31.2	29.4	25.8	
255822-----	4.7	29.8	29.4	24.4	
255822-----	4.9	32.0	30.9	25.9	
255822-----	4.5	29.5	28.7	24.6	
255822-----	4.6	29.7	29.8	25.4	
255822-----	4.9	31.5	28.8	26.1	
255822-----	4.9	32.2	29.8	26.0	
255822-----	4.6	28.0	29.7	26.3	
255822-----	4.6	29.2	29.5	25.8	
255822-----	4.5	28.7	29.9	25.9	
255822-----	4.6	32.3	31.4	26.0	
255838-----	4.5	31.4	33.2	26.5	Mindoro or Luzon.
255838-----	4.4	28.2	29.1	24.8	
255838-----	4.5	31.7	29.1	25.4	
313569-----	5.2	36.6	32.5	28.4	Carayrayan, Calapan, Mindoro.
313569-----	4.9	34.1	31.3	26.1	
313569-----	4.6	30.0	32.3	26.0	
313569-----	5.1	32.9	32.3	27.5	
313569-----	5.0	32.2	31.3	26.5	
313569-----	4.6	30.5	32.3	27.0	

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter	Locality
		Mm	Mm	Mm	
313569	4.9	37.4	32.3	28.4	Mindoro. Menage ^W Expedition, northeastern Mindoro.
313569	4.7	34.2	32.5	28.2	
313569	5.0	32.2	32.1	26.9	
313569	4.6	32.3	31.8	27.5	
313569	4.8	33.3	28.9	24.9	
313569	5.0	30.8	30.1	25.9	
313569	4.6	32.8	32.2	28.2	
106243	4.9	33.4	31.0	28.8	
313570	5.0	35.5	28.6	24.6	
313570	4.9	34.6	28.9	25.8	
313570	5.0	33.5	27.5	23.9	
313570	5.1	39.8	33.0	28.2	
313570	5.0	31.8	27.1	23.2	
313570	5.0	32.7	28.9	24.1	
313570	5.1	32.7	31.3	27.4	
313570	4.9	34.7	30.0	24.8	
313570	5.0	31.3	28.5	24.3	Varadero.
313570	5.0	27.3	31.8	26.4	
313570	5.1	37.0	28.4	25.8	
313570	5.0	35.3	29.4	25.1	
313570	5.1	35.8	31.1	25.4	
313570	5.1	35.8	29.8	25.8	
313570	5.1	39.0	29.2	26.0	
313570	4.6	32.2	30.2	26.1	
313570	5.0	32.6	28.8	24.3	
313570	4.6	34.2	29.1	26.1	
313570	5.1	36.9	30.3	26.1	
313570	5.0	36.8	30.7	27.9	
313570	5.1	35.0	28.3	23.8	
313570	4.9	32.3	30.3	25.6	
313570	5.0	32.7	27.8	24.6	Calapan.
256166	4.8	33.8	28.7	26.2	
256166	4.9	32.4	32.0	27.5	
256166	4.4	27.7	29.3	24.2	
256166	4.9	31.4	33.7	28.1	
313572	5.1	32.6	30.6	26.7	
313572	5.0	33.0	31.5	29.9	
313572	5.0	35.6	33.0	29.2	
313572	4.8	31.8	31.8	26.9	
313572	4.8	33.1	31.1	27.6	
313572	4.8	32.3	31.0	26.5	
313572	5.0	30.9	29.1	25.2	
313572	4.6	30.6	31.0	26.4	
20400	4.7	31.6	28.5	25.4	Exploring Expedition. Mount Halcon.
255829	4.9	31.3	28.8	25.5	
255829	5.1	36.3	30.0	26.7	San Teodoro.
313571	4.6	34.8	32.3	28.0	
313571	4.8	30.9	30.0	26.0	
313571	5.0	32.0	31.7	27.5	
Average	4.84	32.7	30.4	26.19	
Greatest	5.2	39.8	33.7	29.9	
Least	4.4	27.3	27.1	23.2	

I have selected for our illustration a series of specimens to show the degree of variation in the color pattern in the shells before me.

COCHLOSTYLA (HELICOSTYLA) FULGENS JOHNSONI Bartsch

PLATE 97, FIGURES 10-12

1891. *Cochlostyla fulgens* HIDALGO, Obras malacológicas, pp. 453-455 (in part), pl. 50, fig. 4.

1932. *Cochlostyla (Helicostyla) fulgens johnsoni* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 336.

Shell elongate-ovate. Nuclear whorls pale brown, the succeeding whorls milk-white, banded with bright chestnut-brown and almost blackish-brown spiral zones. The spaces between the dark zones on the base are buffish yellow. The interior of the aperture is bluish white, which is also the color of the peristome and the inner lip. Nuclear whorls 2, well rounded, forming a depressed spire. The postnuclear whorls are inflated, appressed at the summit, and marked by very fine retractorily curved lines of growth and microscopic spiral striations both on spire and base. The aperture is almost circular, oblique; the peristome is slightly expanded and reflected, and the columella is slightly excavated. The parietal wall is covered by a thin callus.

The type (U.S.N.M. no. 314080) was collected by Mr. Quadras at Sitio Pamulon, Mansalay Bay, Mindoro. It has 5.5 whorls and measures: Length, 41 mm; greater diameter, 30.4 mm; lesser diameter, 27.4 mm.

Another specimen (U.S.N.M. no. 20399), obtained by the Exploring Expedition, which I am referring here and which bears no locality label, has 5.4 whorls and measures: Length, 37.5 mm; greater diameter, 28 mm; lesser diameter, 26.3 mm.

In addition to this there are two young specimens (U.S.N.M. no. 7589), also collected by the Exploring Expedition, and four young specimens (U.S.N.M. no. 255818) collected by myself on a hill on the western shore of Mansalay Bay. This race is readily distinguished from the other two by its more elevated spire. It has the dark base and variable bands of the typical race.

COCHLOSTYLA (HELICOSTYLA) FULGENS SAPOLANA Bartsch

PLATE 98, FIGURES 1-3

1932. *Cochlostyla (Helicostyla) fulgens sapolana* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 336.

1933. *Helicostyla (Helicostyla) fulgens* CLENCH and ARCHER, Papers Michigan Acad. Sci., Arts, and Letters, vol. 17, p. 543; in part.

Shell broadly ovate. Nuclear whorls pale horn color; postnuclear whorls white, the first with a median brown band, which on the last whorl is almost black. A similar dark band is at the periphery and two on the base. The columellar area is likewise almost black. The spaces separating these bands on the base are pale straw yellow.

The interior of the aperture is white, showing the dark bands within. The peristome is white. Nuclear whorls 2, well rounded, forming an almost flat apex. The postnuclear whorls are inflated and strongly rounded, marked by retractorily curved lines of growth, which extend to the umbilicus on the last whorl, and by fine microscopic spiral striations, which are present on spire and base. The aperture is almost circular, oblique. The peristome is slightly expanded and reflected, somewhat excavated on the columellar side. The parietal wall is covered by a thin callus.

The type (U.S.N.M. no. 313574) was collected by Pedro de Mesa on Mount Sapol near Calapan, Mindoro. It has 4.9 whorls and measures: Length, 30.8 mm; greater diameter, 31.8 mm; lesser diameter, 27.8 mm.

Five topotypes (U.S.N.M. no. 313573), from the same source, yield the following measurements:

Number of whorls	Length	Greater diameter	Lesser diameter
	<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
4.7-----	32. 8	31. 1	28. 0
4.6-----	31. 4	29. 2	26. 0
4.9-----	34. 3	31. 0	27. 3
4.7-----	33. 8	31. 4	27. 8
4.3-----	27. 8	30. 1	25. 0

The last specimen received a bad injury in the early state of its development, which may be responsible for its dwarfing.

Two of the specimens before me have only two basal bands plus the dark columellar area.

This race is distinguished from typical *fulgens* in lacking the dark olivaceous-yellow base. Here the base is only a trifle more yellowish than the spire.

COCHLOSTYLA (HELICOSTYLA) DIMERA (Jonas)

PLATE 97, FIGURES 7-9

1846. *Helix dimera* JONAS, Abh. Naturw. Ver. Hamburg, vol. 1, p. 123, pl. 11, figs. 19, 19a.

1846. *Helix jonasi* var. β , PFEIFFER, Proc. Zool. Soc. London, 1845, p. 126.

1848. *Helix dimera* PFEIFFER, Monographia heliceorum viventium, vol. 1, p. 226.

1850. *Helix dimera* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, ed. 2, vol. 1, Abt. 12, Theil 2, p. 299.

1850. *Helicostyla dimera* ALBERS, Die Heliceen, ed. 1, p. 104.

1851. *Helix dimera* REEVE, Conchologia iconica, pl. 16, fig. 61.

1853. *Helix dimera* PFEIFFER, Monographia heliceorum viventium, vol. 3, p. 172.

1855. *Helicostyla dimera* H. and A. ADAMS, The genera of recent Mollusca, vol. 2, p. 191.

1856. *Helicostyla dimera* PFEIFFER, Malakozool. Blätter, vol. 2, p. 145.

1859. *Helicostyla dimera* PFEIFFER, Monographia heliceorum viventium, vol. 4, p. 198.
1860. *Helicostyla dimera* MARTENS, Albers, Die Heliceen, ed. 2, p. 175.
1868. *Helix dimera* PFEIFFER, Monographia heliceorum viventium, vol. 5, p. 267.
1877. *Cochlostyla dimera* SEMPER, Reisen im Archipel der Philippinen, pt. 2, vol. 3, p. 187.
1887. *Cochlostyla dimera* HIDALGO, Journ. Conchyl., vol. 35, p. 141.
1892. *Cochlostyla dimera* PILSBRY, Man. Conch., ser. 2, vol. 7, p. 156, pl. 30, figs. 29, 30.
1895. *Helicostyla dimera* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 223.
1897. *Helix dimera* HIDALGO, Journ. Conchyl., vol. 44, pp. 245, 279, 290, 331, 332, 340, 349, 351.
1898. *Cochlostyla dimera* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 122; in part.
1901. *Cochlostyla dimera* HIDALGO, Obras malacologicas, pt. 1, pp. 481-482 (in part), pl. 48, fig. 8.
1910. *Helix dimera* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 203-204 (in part), pl. 41, figs. 4, 4a, 5.
1932. *Cochlostyla (Helicostyla) dimera* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 336.

Shell broadly ovate, covered with a very thin pale olive-yellow periostracum, which is usually absent on the early turns. When the periostracum is removed the nuclear whorls are brown, while the succeeding turns are also brown but gradually become paler, passing through a rosy tinge to white. A moderately dark brown band is present at the summit and another immediately posterior to the periphery with the space between flesh-colored. This color scheme terminates abruptly at the periphery of the last whorl, from there anteriorly to the umbilical area. The broad base is chocolate-brown, which is also the color of the outer lip, while the columella is flesh-color except at the extreme tip, which is chocolate-brown. The interior of the aperture is divided in its color scheme between bluish white posteriorly and chocolate-brown basally. The 1.6 nuclear whorls are moderately elevated, well rounded, and marked by incremental lines only. The postnuclear whorls are moderately well rounded and marked by fine, retractively slanting, incremental lines, which are almost threadlike, and numerous microscopic spiral striations on both spire and base. The aperture is almost subcircular, oblique; outer lip slightly expanded and reflected. The columella is excavated and spreads over the base as a whitish callus.

The specimen described and figured (U.S.N.M. no. 313617), collected by Quadras on Mindoro, has 5.2 whorls and measures: Length, 29.9 mm; greater diameter, 26.3 mm; lesser diameter, 23.4 mm.

A series of the specimens in our collection yields the following measurements:

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
90345-----	5. 0	27. 3	27. 7	23. 4
103947-----	5. 0	28. 2	26. 4	23. 6
103947-----	5. 2	30. 6	27. 7	23. 6
103947-----	5. 3	32. 2	27. 1	24. 9
309463-----	5. 1	29. 8	27. 5	24. 3
309463-----	4. 9	30. 5	30. 2	25. 4
315709-----	5. 0	32. 4	33. 2	27. 4
315709-----	4. 9	28. 2	28. 4	24. 4
315708-----	4. 4	25. 2	26. 4	22. 8
Average-----	4. 98	29. 38	28. 29	24. 42
Greatest-----	5. 3	32. 4	33. 2	27. 4
Least-----	4. 4	25. 2	26. 4	22. 8

Subgenus COCHLOSTYLA Férussac

In this subgenus the shell varies from ovate to elongate-ovate. The apex is blunt and the aperture broadly oval to subcircular. The peristome is slightly expanded and reflected, while the columella is somewhat excavated. The periphery may be rounded or show the merest suggestion of angulation. The surface is covered with a rather strong periostracum, which shows axial hydrophanous zones that usually extend to the umbilical area. The shells may be unicolor or variously spirally banded.

Type: *Cochlostyla* (*Cochlostyla*) *metaformis* (Férussac).

Only one species from Mindoro Province belonging here is known: *Cochlostyla* (*Cochlostyla*) *hydrophana* (Sowerby).

COCHLOSTYLA (COCHLOSTYLA) HYDROPHANA (Sowerby)

Shell ovate or elongate-ovate, covered by a thin hydrophanous periostracum, which is frequently denuded on the early whorls. The nuclear whorls and the early postnuclear turns are white. There is a brown band immediately below the summit and another one at the periphery. These vary in width in different individuals. There is also a median band on the base and a dark columellar area. These bands may be all of the same color, or the peripheral one may be a little lighter than the rest. As a rule they are dark chocolate-brown. The interior of the aperture is bluish white, and so is the peristome. Nuclear whorls 2, well rounded and marked by incremental lines only, except on the last portion of the last whorl, where fine spiral striations are indicated. The postnuclear whorls are strongly rounded, appressed at the summit, and marked by retractorily slanting incremental lines and exceedingly closely spaced microscopic spiral striations on both spire and base. The periphery of the last whorl is well rounded, and the base is somewhat inflated and strongly rounded. The aperture is subcircular, the outer lip being moderately expanded

and reflected, while the columella has a twist that gives it almost the appearance of having a tooth a little nearer to its base than its insertion.

Sowerby described this species from the Cuming collection, and he cites Puerto Galera, Island of Mindoro, as the type locality. I collected specimens on Medio Island, which is in Puerto Galera, that in every way correspond with Sowerby's form, and I am inclined to believe that his shell came from Medio Island. On the other hand, the shells that I collected to the east of the peninsula on which Puerto Galera is located, namely, Varadero Bay, yielded a much more elevated form, to which I have given the subspecific name *varaderoana*. The two races may be distinguished by the following key:

KEY TO THE SUBSPECIES OF *COCHLOSTYLA* (*COCHLOSTYLA*) *HYDROPHANA*

Shell decidedly elevated.....*varaderoana*
Shell not decidedly elevated.....*hydrophana*

COCHLOSTYLA (*COCHLOSTYLA*) *HYDROPHANA VARADEROANA* Bartsch

PLATE 99, FIGURE 3

1932. *Cochlostyla* (*Cochlostyla*) *hydrophana veroderoana* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 336.

Shell elongate-ovate. The nuclear whorls and the first postnuclear whorls white; the later ones with a very narrow light zone at the summit followed by a darker band immediately below the summit, which sometimes is pale, at other times quite dark chocolate-brown. There is also a brown band immediately posterior to the periphery and another on the middle of the base, and a conspicuous dark columellar area. These are all separated by brown zones of flesh-color in the decorticated specimens, or where the periostracum is present by an olivaceous or olivaceous-waxy color band. The interior of the aperture and peristome are white.

The type (U.S.N.M. no. 313619) was collected by me at Varadero, Mindoro. It has 5.1 whorls and measures: Length, 36.8 mm; greater diameter, 28.7 mm; lesser diameter, 26.0 mm.

Seven topotypes (U.S.N.M. no. 256166) yield the following measurements:

Number of whorls	Length	Greater diameter	Lesser diameter
	<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
5. 1 -----	33. 2	27. 5	24. 3
5. 5 -----	37. 0	28. 0	25. 8
5. 2 -----	37. 3	28. 3	25. 3
5. 3 -----	36. 4	28. 2	25. 3
5. 5 -----	36. 4	28. 2	25. 0
5. 5 -----	37. 0	28. 3	25. 8
5. 2 -----	34. 8	26. 8	24. 3

COCHLOSTYLA (COCHLOSTYLA) HYDROPHANA HYDROPHANA (Sowerby)

PLATE 99, FIGURE 1

1841. *Helix* (*Cochlogena*) *hydrophana* SOWERBY, Proc. Zool. Soc. London, 1840, p. 88.
1842. *Bulimus hydrophana* PFEIFFER, Symbolae, vol. 2, p. 46.
1848. *Helix hydrophana* PFEIFFER, Monographia heliceorum viventium, vol. 1, p. 222.
1848. *Bulimus hydrophana* REEVE, Conchologia iconica, pl. 17, fig. 69.
1850. *Helix hydrophana* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, ed. 2, vol. 1, Abt. 12, Theil 2, pp. 290-291, pl. 49, figs. 8, 9.
1850. *Bulimus* (*Orthostylus*) *hydrophana* ALBERS, Die Heliceen, ed. 1, p. 136.
1853. *Bulimus hydrophanus* PFEIFFER, Monographia heliceorum viventium, vol. 3, p. 397.
1859. *Bulimus hydrophanus* PFEIFFER, Monographia heliceorum viventium, vol. 4, p. 358.
1860. *Cochlodryas hydrophanus* MARTENS, Albers, Die Heliceen, ed. 2, p. 176.
1868. *Bulimus hydrophanus* PFEIFFER, Monographia heliceorum viventium, vol. 6, p. 6.
1869. *Helicostyla hydrophana* FRAUENFELD, Verh. Zool. Bot. Ver. Wien, vol. 19, p. 875.
1877. *Helicostyla hydrophana* PFEIFFER, Monographia heliceorum viventium, vol. 8, p. 7; in part.
1887. *Cochlostyla hydrophana* HIDALGO, Journ. Conchyl., vol. 35, p. 148.
1892. *Cochlostyla hydrophana* PILSBRY, Man. Conch., ser. 2, vol. 7, p. 187, pl. 36, figs. 35-37.
1895. *Helicostyla hydrophana* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 225.
1896. *Helicostyla hydrophana* ELERA, Catalogo sistematico de toda la fauna de Filipinas, vol. 3, p. 587.
1897. *Cochlostyla hydrophana* HIDALGO, Journ. Conchyl., vol. 44, pp. 288, 331, 335, 338, 339, 341, 350.
1898. *Cochlostyla metaformis* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 124; in part.
1901. *Cochlostyla metaformis hydrophana* HIDALGO, Obras malacologicas, p. 432, pl. 77, figs. 2, 3; pl. 108, figs. 6, 7.
1910. *Cochlostyla* (*Dryocochlias*) *metaformis*, MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 213-215.
1932. *Cochlostyla* (*Cochlostyla*) *hydrophana hydrophana* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 336.

Shell broadly ovate, covered with a thin hydrophanous periostracum. Nuclear whorls 2, well rounded, forming a flattish apex. The postnuclear whorls are inflated, strongly rounded, and marked with a narrow light zone edging the summit, succeeded by a broad chocolate-brown band, which in turn is followed by a still broader flesh-colored zone that is succeeded by a band of brown equaling in intensity of color and width that adjacent to the summit, which terminates anteriorly at the periphery. Adjacent to this the base bears a flesh-colored zone, equaling the median one on the spire, and a median chocolate-brown band equaling the supraperipheral band. There is also a broad chocolate-brown area about the umbilicus, and the space

between it and the median basal band is flesh-color. The anterior of the aperture is bluish white, which is also the color of the somewhat expanded outer lip and columella.

A series of specimens, mostly young and imperfect, was collected by me on Medio Island, Puerto Galera, during the *Albatross Expedition* to the Philippines.

The specimen described and figured (U.S.N.M. no. 255908) has 5 whorls and measures: Length, 32.6 mm; greater diameter, 28.6 mm; lesser diameter, 24.7 mm.

Two additional individuals under the same registry, from the same source, have each 5 whorls. They measure: Length, 32.4 and 35.7 mm; greater diameter, 27.4 and 29.3 mm; lesser diameter, 23.3 and 25.5 mm, respectively.

This race differs from *Cochlostyla* (*Cochlostyla*) *hydrophana varaderoana* in being broadly ovate.

Subgenus COCHLODRYAS Martens

In this subgenus the shell is subglobular, sometimes a little more depressed and sometimes a little more elevated. The periostracum is very thin, usually a mere film, and frequently absent, being easily worn off. All the species are marked with green. The shell may be unicolor or banded with spiral zones of green or brown or a combination of these. A columellar dark patch may or may not be present. A narrow white thread is present at the summit. The aperture varies from subcircular to subquadrate.

Type: *Cochlostyla* (*Cochlodryas*) *polychroa* (Sowerby).

COCHLOSTYLA (COCHLODRYAS) FLORIDA (Broderip)

The shell is broadly ovate and rather flat, with a blunt apex. The surface is covered by a thin dull periostracum, which is usually some shade of green or olive, though in some forms brown or pale olivaceous-waxy. The early whorls may be white or brown, and the ground color of the succeeding turns, when the periostracum is removed, is white. The shell may be unicolor on its exterior or it may have spiral bands. There may be a zone below the summit, another at the periphery, and one between the two, and there is usually a dark area about the columella though in *Cochlostyla* (*Cochlodryas*) *helicoides* this element is missing. Any one of the brown bands may disappear. In addition to these brown bands, there is always a narrow white zone at the summit immediately above the first brown band. The interior of the aperture and the peristome are white. This species, as far as known, appears to be confined to eastern Mindoro and breaks up into a series of races, which are here defined.

KEY TO THE SUBSPECIES OF COCHLOSTYLA (COCHLODRYAS) FLORIDA

Columellar area of base dark.

Periostracum leaf green.....florida

Periostracum not leaf green.

Periostracum olivaceous-brown.....fuscolabiata

Periostracum not olivaceous-brown.

Periostracum golden-yellow.....aureola

Periostracum not golden-yellow.

Periostracum olivaceous waxy yellow.....signa

Columellar area not dark.....helicoidea

COCHLOSTYLA (COCHLODRYAS) FLORIDA FLORIDA (Broderip)

PLATE 99, FIGURE 12

1841. *Helix (Cochlogena) florida* BRODERIP, Proc. Zool. Soc. London, 1840, pp. 87-88.
1842. *Helix florida* REEVE, Conchologia systematica, vol. 2, p. 69, pl. 153, fig. 2.
1842. *Bulimus florida* PFEIFFER, Symbolae, vol. 2, p. 47.
1848. *Helix florida* PFEIFFER, Monographia heliceorum viventium, vol. 1, p. 222.
1849. *Bulimus florida* PFEIFFER, Zeitschr. Malak., vol. 6, p. 86.
1850. *Helix florida* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, ed. 2, vol. 1, Abt. 12, Theil 1, p. 295, pl. 50, figs. 1, 2.
1850. *Orthostylus floridus* ALBERS, Die Heliceen, ed. 1, p. 136.
1851. *Helix floridus* REEVE, Conchologia iconica, pl. 11, fig. 43b.
1851. *Helix florida* DESHAYES, Férussac's Histoire naturelle . . . mollusques . . ., vol. 1, pp. 307-308 (in part), pl. 104A, figs. 9-10.
1853. *Bulimus florida* PFEIFFER, Monographia heliceorum viventium, vol. 3, p. 297.
1855. *Helicostyla florida* H. and A. ADAMS, The genera of recent Mollusca, vol. 2, p. 192.
1856. *Bulimus florida* PFEIFFER, Malakozool. Blätter, vol. 2, p. 146.
1859. *Bulimus florida* PFEIFFER, Monographia heliceorum viventium, vol. 4, p. 359.
1860. *Cochlodryas floridus* MARTENS, Albers, Die Heliceen, ed. 2, p. 176.
1868. *Bulimus floridus* PFEIFFER, Monographia heliceorum viventium, vol. 6, p. 6.
1876. *Bulimus floridus* PFEIFFER, Monographia heliceorum viventium, vol. 7, p. 7; in part.
1887. *Cochlostyla florida* HIDALGO, Journ. Conchyl., vol. 35, pp. 151-152; in part.
1891. *Cochlostyla florida* PILSBRY, Man. Conch., ser. 2, vol. 6, pp. 177-178 (in part), pl. 38, figs. 71-73.
1895. *Helicostyla florida* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 225; in part.
1896. *Cochlostyla florida* ELERA, Catalogo sistematico de toda la fauna de Filipinas, vol. 3, p. 584; in part.
1897. *Cochlostyla florida* HIDALGO, Journ. Conchyl., vol. 44, pp. 251, 284, 287, 331, 341, 347, 348, 351, 352.
1898. *Cochlostyla florida* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 131; in part.
1901. *Cochlostyla florida* HIDALGO, Obras malacologicas, pp. 455-456 (in part), pl. 39, figs. 4-8.
1911. *Cochlostyla florida* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 248-249, pl. 51, figs. 1, 1a, 2; in part.

1932. *Cochlostyla (Cochlodryas) florida florida* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 336.

Shell ovate, the last turn with a bright grass-green periostracum, which gradually grows paler posteriorly and eventually passes into the flesh-colored apex. In typically colored specimens there is a narrow white thread at the summit followed by a brown band immediately adjacent to this. There is also a brown spiral band of about equal width at the periphery and another between the two. The columellar area is surrounded by a bright chestnut-brown patch. The interior of the aperture and peristome are white. The nucleus consists of 1.8 turns, which are smooth, barring incremental lines and indications of fine spiral striations on the last turn. The nuclear turns and the first postnuclear turns form a blunt apex. The postnuclear whorls are somewhat inflated, strongly rounded, appressed at the summit, and marked by feebly retractorily curved lines of growth and very fine spiral striations on both spire and base. The periphery of the last turn is well rounded. The base is short, somewhat inflated, well rounded. The aperture is oblique, broadly oval. The peristome is somewhat expanded and reflected and slightly thickened. The columella is oblique, slightly excavated.

The specimen described and figured (U.S.N.M. no. 313605) was collected by Quadras at Baco in northeastern Mindoro. It has 5.2 whorls and measures: Length, 36.2 mm; greater diameter, 27.6 mm; lesser diameter, 24.5 mm.

A series of specimens (U.S.N.M. no. 313603), collected by the Menage Expedition in northeastern Mindoro, collector's no. 45, yields the following measurements:

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
313603.....	5.5	31.4	28.7	24.7
313603.....	5.1	33.2	25.5	23.6
313603.....	5.5	35.7	28.2	25.5
313603.....	5.4	32.5	27.4	24.5
313603.....	5.4	31.0	28.5	25.5
313603.....	5.1	31.9	27.0	34.2
313603.....	5.2	33.3	26.4	23.0
313603.....	5.5	35.6	27.6	25.3
313603.....	5.5	36.3	29.9	26.4
313603.....	5.1	30.7	27.2	23.8
313603.....	5.3	32.3	28.3	25.5
313603.....	5.5	30.7	25.0	32.0
313603.....	5.2	30.1	25.8	23.9
313603.....	5.4	33.0	25.9	24.0
313603.....	5.5	36.7	26.1	22.9
313603.....	5.5	38.0	28.4	25.9
313603.....	5.5	32.5	26.8	24.0
313603.....	5.6	33.2	27.8	25.1
313603.....	5.5	33.9	27.3	24.9
313603.....	5.8	36.8	26.9	24.2
313603.....	5.6	35.5	26.8	24.7
313603.....	5.5	33.2	26.0	24.2

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
313603.....	5.3	30.2	25.8	23.6
313603.....	5.3	33.4	29.0	25.2
130844.....	5.3	33.2	27.1	24.8
104383.....	5.6	34.8	27.5	24.9
104383.....	5.0	31.0	28.5	24.8
104383.....	5.4	34.1	28.2	25.5
1273.....	5.5	34.5	28.1	25.2
195437a.....	5.3	30.2	26.0	22.8
195437a.....	4.6	26.9	25.0	22.2
313604.....	5.0	31.5	25.8	23.0
Average.....	5.36	33.04	27.14	24.99
Greatest.....	5.8	38.0	29.9	34.2
Least.....	4.6	26.9	25.0	22.2

This race varies somewhat in color pattern. All of them have a dark band near the summit and the columellar dark area. In some of the others the peripheral zone varies considerably in width and in some specimens extends over the posterior half of the turn.

COCHLOSTYLA (COCHLODRYAS) FLORIDA FUSCOLABIATA Möllendorff, Kobelt, and Winter

PLATE 99, FIGURE 10

1851. *Helix floridus* REEVE, *Conchologia iconica*, pl. 11, fig. 43c.

1911. *Cochlostyla florida fuscolabiata* MÖLLENDORFF, KOBELT, and WINTER, *Semper's Reisen im Archipel der Philippinen*, vol. 10, pp. 248-249 (in part), pl. 51, fig. 3.

1932. *Cochlostyla (Cochlodryas) florida fuscolabiata* BARTSCH, *Journ. Washington Acad. Sci.*, vol. 22, p. 336.

Möllendorff, Kobelt, and Winter, as cited above, described a dark olivaceous-brown shell under the above designation. I am not certain as to whether this is merely a color form that may occur in any of the races or whether it is a distinct subspecies. I have but a single specimen before me collected by Quadras (U.S.N.M. no. 313609) that is referable here. This has the light nuclear turns. The post-nuclear whorls begin by having the anterior half pale brown, the brown gradually becoming intensified in color. There is a subsummit brown band, which becomes feeble on the last whorl, and there is also a dark columellar area. The space between is olivaceous-brown marked by axial streaks of more intense pigmentation, giving the shell an almost varicid appearance. The light zone at the summit is unusually broad in this specimen. The interior of the aperture has also the merest indication of a brownish wash over the white, and the outer edge of the peristome is tinged with brown.

The specimen has 5.1 whorls and measures: Length, 35.6 mm; greater diameter, 30.3 mm; lesser diameter, 26.3 mm. It bears Quadras' collector's no. 2109 and is labeled "Mindoro" without specific locality.

COCHLOSTYLA (COCHLODRYAS) FLORIDA AUREOLA Bartsch

PLATE 99, FIGURE 11

1932. *Cochlostyla (Cochlodryas) florida aureola* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 337.

Shell ovate, covered with a rather thick golden-yellow periostracum on the last turn. This color gradually becomes paler posteriorly and eventually merges into white on the first nuclear and postnuclear turns. The usual light thread is present at the summit of the whorls and is followed by a moderately broad dark chestnut-brown band. The dark columellar area is also present. The base is slightly darker than the portion between the periphery and the summit. The interior of the aperture and the peristome are bluish white. Nuclear whorls 1.7, well rounded, smooth except for incremental lines and fine microscopic spiral striations on the last portion of the last turn. The postnuclear turns are somewhat inflated, well rounded, appressed at the summit, and marked by inconspicuous incremental lines and closely spaced microscopic spiral striations, which are present on both spire and base. The aperture is broadly oval, almost circular; the peristome is expanded and reflected and the columella is slightly excavated.

The type (U.S.N.M. no. 313610) is one of three specimens obtained by the Exploring Expedition, probably at the southern tip of Mindoro. It has 5.4 whorls and measures: Length, 34.7 mm; greater diameter, 26.8 mm; lesser diameter, 23.9 mm.

The two additional specimens (U.S.N.M. no. 7617) yield the following measurements: Number of whorls, 5.6 and 5.4; length, 34.1 and 32.4 mm; greater diameter, 26.5 and 25.9 mm; lesser diameter, 23.2 and 23.3 mm, respectively. In shape this race reminds one of *Cochlostyla (Cochlodryas) florida signa* but can at once be distinguished from it by its heavier shell and entirely different coloration.

COCHLOSTYLA (COCHLODRYAS) FLORIDA SIGNA Bartsch

PLATE 99, FIGURE 2

1932. *Cochlostyla (Cochlodryas) florida signa* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 337.

The shell is very regularly ovate and very thin. The early whorls are white, the later turns covered with an olivaceous-waxy periostracum. There is a light narrow thread at the summit followed by a narrow bright chestnut-brown band. The columellar area is also bordered by a narrow bright chestnut-colored zone. The interior of the aperture is bluish white, which is also the color of the peristome, while the columella is white plus a dark spot at its junction with the basal lip. Nuclear whorls 1.6, marked by lines of growth and on the

last portion by indications of fine spiral lines. The postnuclear whorls are well rounded, somewhat inflated, and marked by re-tractively curved lines of growth and microscopic spiral striations on both spire and base. The periphery is well rounded. The base is somewhat inflated and strongly rounded. The aperture is almost circular, oblique. The peristome is moderately expanded and reflected. The columella is rather narrow and excavated.

The type (U.S.N.M. no. 313611) was collected by me on the hill on the west shore of Mansalay Bay, Mindoro. It has 5.4 whorls and measures: Length, 31.8 mm; greater diameter, 24.3 mm; lesser diameter, 21.9 mm.

A series of topotypes yields the following additional measurements:

U.S.N.M.no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
255895.....	5.2	30.1	23.6	22.2
255895.....	5.6	30.7	24.9	22.4
255895.....	5.3	30.8	25.1	23.5
255895.....	5.0	30.7	26.0	23.5
255895.....	4.8	27.4	25.9	23.4
255895.....	5.5	28.4	31.9	21.0
255895.....	5.6	32.7	26.4	23.6
255895.....	5.2	30.0	24.9	23.0
255895.....	5.4	29.3	24.6	22.7
255895.....	5.2	29.1	26.0	23.2
255895.....	5.6	30.5	23.2	21.7
255958.....	5.5	31.4	24.1	22.2
255778.....	5.1	30.7	26.4	23.4
255778.....	5.2	31.5	27.4	25.1
255778.....	5.6	38.0	30.8	27.3
255778.....	5.7	34.8	27.4	24.3
Average.....	5.3	31.0	26.16	23.3
Greatest.....	5.7	38.0	31.9	27.3
Least.....	4.8	27.4	23.2	21.0

Two of the specimens have also a peripheral band, and one has a band between that of the summit and the periphery.

This race is distinguished from all the others by its exceedingly thin shell and the curious pale coloration of the periostracum, which is of an olivaceous-waxy color.

In this as in other species I collected in Mansalay Bay we find a distinction between those obtained on the west shore and those on the east shore, the differentiation being a parallel one in all the instances.

COCHLOSTYLA (COCHLODRYAS) FLORIDA HELICOIDES (Pfeiffer)

PLATE 99, FIGURE 4

1841. *Helix* (*Cochlogena*) *florida* var. *a* BRODERIP, Proc. Zool. Soc. London, 1840, pp. 87-88.
1851. *Helix florida* REEVE, Conchologia iconica, pl. 11, fig. 43a.
1851. *Helix florida* DESHAYES, Férussac's Histoire naturelle . . . mollusques . . . , vol. 1, pp. 307-308 (in part), pl. 104A, fig. 11.
1853. *Bulimus helicoides* PFEIFFER, Monographia heliceorum viventium, vol. 3, p. 298.
1855. *Bulimus helicoides* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, ed. 2, vol. 1, Abt. 13, Theil 1, pp. 119-120, pl. 36, figs. 7, 8.
1868. *Bulimus helicoides* PFEIFFER, Monographia heliceorum viventium, vol. 6, p. 524.
1876. *Bulimus floridus* PFEIFFER, Monographia heliceorum viventium, vol. 7, p. 7; in part.
1887. *Cochlostyla florida helicoides* HIDALGO, Journ. Conchyl., vol. 35, p. 152.
1890. *Cochlostyla florida* PILSBRY, Man. Conch., ser. 2, vol. 6, pp. 177-178 (in part), pl. 38, fig. 70.
1895. *Helicostyla florida* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 225; in part.
1896. *Cochlostyla florida* ELERA, Catalogo sistematico de toda la fauna de Filipinas, vol. 3, p. 584; in part.
1897. *Cochlostyla helicoides* HIDALGO, Journ. Conchyl., vol. 44, pp. 251, 253, 284, 287.
1898. *Cochlostyla florida* MÖLLENDORF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 131; in part.
1901. *Cochlostyla florida* HIDALGO, Obras malacologicas, pp. 455-457 (in part), pl. 39, figs. 2, 3.
1911. *Cochlostyla florida* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 248-249 (in part), pl. 51, figs. 4, 4a.
1932. *Cochlostyla* (*Cochlodryas*) *florida helicoides* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 337.

The shell is broadly ovate. The periostracum, where present, is bright olive-green. There are no spiral brown bands, nor is there a dark columellar area apparent in any of the specimens before me. The light zone at the summit is present, and the aperture and peristome are white. The early whorls and nucleus are usually denuded of periostracum and are also white. Nuclear whorls 2, well rounded and marked by incremental lines only. The postnuclear whorls are somewhat inflated, appressed at the summit, well rounded, and marked by retractively curved lines of growth and microscopic spiral striations, which are present on both spire and base. The aperture is broadly obliquely oval; the peristome is moderately expanded and reflected; the columella is somewhat excised.

The specimen described and figured (U.S.N.M. no. 313606a) has 5.3 whorls and measures: Length, 30 mm; greater diameter, 26.4 mm; lesser diameter, 23.3 mm.

A series of additional specimens yields the following measurements:

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
313606-----	5. 1	32. 0	27. 9	25. 3
313606-----	5. 4	34. 0	26. 7	24. 3
313606-----	5. 3	33. 2	27. 3	24. 4
313606-----	5. 5	34. 5	26. 0	24. 1
313606-----	5. 0	31. 3	27. 0	24. 2
313606-----	5. 1	30. 7	26. 5	23. 8
313606-----	5. 5	35. 2	27. 4	25. 1
313606-----	5. 0	29. 2	26. 2	23. 0
313606-----	5. 0	27. 4	24. 0	22. 1
313606-----	5. 1	30. 3	27. 3	24. 8
313606-----	5. 0	26. 6	25. 9	22. 9
313606-----	5. 5	38. 2	28. 5	26. 0
313606-----	5. 1	29. 3	26. 5	23. 3
313606-----	5. 6	35. 6	27. 6	25. 4
313606-----	5. 4	32. 4	27. 9	24. 9
313606-----	5. 8	35. 8	27. 9	24. 5
313606-----	5. 2	31. 6	27. 1	24. 0
313606-----	5. 2	31. 5	26. 1	23. 6
313606-----	5. 1	30. 8	26. 7	23. 7
313606-----	5. 2	31. 0	25. 2	22. 6
313606-----	5. 4	32. 5	25. 3	23. 6
313606-----	5. 2	33. 6	29. 8	25. 8
313606-----	4. 9	29. 0	26. 6	23. 9
313606-----	5. 5	34. 9	28. 0	24. 3
313606-----	5. 1	32. 4	27. 8	23. 5
313606-----	5. 5	35. 3	28. 8	25. 4
313606-----	5. 3	31. 7	28. 2	25. 0
313606-----	5. 4	34. 5	28. 8	24. 8
313606-----	5. 5	33. 9	25. 7	23. 7
313606-----	5. 2	32. 5	29. 0	25. 4
313606-----	5. 5	33. 6	28. 3	25. 0
313606-----	5. 4	31. 5	26. 5	23. 4
313606-----	5. 5	32. 5	26. 0	23. 4
313606-----	5. 1	32. 1	26. 6	24. 0
313606-----	5. 3	31. 0	27. 0	33. 9
313606-----	5. 5	34. 0	28. 2	25. 5
313606-----	5. 3	33. 2	28. 9	25. 3
313606-----	5. 3	32. 7	26. 2	23. 1
313606-----	5. 5	34. 8	27. 8	25. 1
313606-----	5. 4	33. 3	28. 4	25. 2
313606-----	5. 2	31. 3	25. 9	22. 9
313606-----	5. 4	34. 0	28. 0	24. 7
313606-----	5. 5	33. 5	28. 0	24. 9
313606-----	5. 4	34. 1	29. 1	25. 9
313606-----	5. 3	34. 8	27. 3	24. 9
313606-----	5. 4	32. 4	26. 0	23. 5
313606-----	5. 3	32. 7	27. 4	24. 4
313606-----	5. 1	30. 0	26. 8	23. 6
313606-----	5. 2	35. 0	30. 2	26. 3
313606-----	5. 0	30. 1	27. 0	23. 8
313606-----	5. 2	29. 5	26. 9	23. 1
313606-----	5. 0	27. 2	24. 3	21. 4
309369-----	5. 0	33. 3	26. 3	23. 7
309369-----	5. 5	33. 0	27. 3	24. 2
130842-----	5. 2	32. 1	27. 5	23. 8
130842-----	5. 0	29. 8	25. 8	22. 2
195437-----	5. 5	35. 4	25. 7	23. 9
Average-----	5. 28	32. 4	27. 1	24. 36
Greatest-----	5. 8	38. 2	30. 2	26. 3
Least-----	4. 9	26. 6	24. 0	21. 4

I am here again quite puzzled. The Worcester and Bourns journals pertaining to the Menage Expedition appear to have been lost, and while we know that they collected on the slopes of Mount Halcon and about Calapan and Naujan, we do not have definite localities applying to the numbers on the specimens. For example, their *Cochlostyla* (*Cochlodryas*) *florida* bears the number 45. The specimen I have bears the number 282. This may indicate a different zoogeographic region, and I think it does, and it is for that reason that I believe we are dealing with a distinct subspecies. Furthermore, I have no absolute intergrades between this and *C. (C.) florida florida*. I have therefore treated it as a distinct subspecies coming from somewhere in northeastern Mindoro.

COCHLOSTYLA (COCHLODRYAS) FLORIDA (?)

A series of specimens (U.S.N.M. no. 255778) collected on the east shore of Mansalay Bay show that the race occupying this region has a thick brownish periostracum and is banded like the typical race, but all our specimens are badly worn; I therefore refrain from defining and naming it here. When more material comes to hand, this race will undoubtedly have to be recognized. It is larger and heavier than and in every way different from the one that I have described from the hills on the western shore of Mansalay Bay.

COCHLOSTYLA (COCHLODRYAS) ORBITULA (Sowerby)

PLATE 99, FIGURE 6

1841. *Helix* (*Cochlostyla*) *orbitulus* SOWERBY, Proc. Zool. Soc. London, 1840¹ p. 103.
1842. *Helix orbitula* PFEIFFER, Symbolae, vol. 2, p. 35².
1848. *Helix orbitula* PFEIFFER, Monographia heliceorum viventium, vol. 1, p. 224.
1850. *Helix orbitula* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, ed. 2, vol. 1, Abt. 12, Theil 1, pp. 296-297 (in part), pl. 50, figs. 7, 8.
1850. *Helicostyla orbitula* ALBERS, Die Heliceen, ed. 1, p. 104.
1851. *Helix orbitula* REEVE, Conchologia iconica, pl. 10, figs. 60a, 60b.
1851. *Helix orbitula* DESHAYES, Férussac's Histoire naturelle . . . mollusques . . ., vol. 1, pp. 311-312, pl. 108A, figs. 7, 8.
1853. *Helix orbitula* PFEIFFER, Monographia heliceorum viventium, vol. 3, p. 298.
1855. *Helicostyla orbitula* H. and A. ADAMS, The genera of recent Mollusca, vol. 2, p. 192.
1856. *Bulimus orbitula* PFEIFFER, Malakozool. Blätter, vol. 2, p. 146.
1859. *Bulimus orbitula* PFEIFFER, Monographia heliceorum viventium, vol. 4, p. 359.
1860. *Helicostyla orbitulus* MARTENS, Albers, Die Heliceen, ed. 2, p. 175.
1868. *Bulimus orbitula* PFEIFFER, Monographia heliceorum viventium, vol. 5, p. 7.
1876. *Bulimus orbitula* PFEIFFER, Monographia heliceorum viventium, vol. 8, p. 7.
1877. *Cochlostyla orbitula* SEMPER, Reisen im Archipel der Philippinen, pt. 2, vol. 3, p. 199.
1887. *Cochlostyla orbitula* HIDALGO, Journ. Conchyl., vol. 35, p. 152.
1890. *Cochlostyla orbitula* PILSBRY, Man. Conch., ser. 2, vol. 6, p. 179, pl. 58, figs. 98, 99.

1895. *Helicostyla orbitula* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 225.
1896. *Cochlostyla orbitula* ELERA, Catalogo sistematico de toda la fauna de Filipinas, vol. 3, p. 585.
1897. *Cochlostyla orbitula* HIDALGO, Journ. Conchyl., vol. 44, pp. 260, 331, 335, 341, 351.
1898. *Cochlostyla orbitula* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 131.
1901. *Cochlostyla orbitulus* HIDALGO, Obras malacologicas, p. 459, pl. 38, figs. 6, 7; pl. 95, fig. 2.
1910. *Cochlostyla orbitula* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 149-150, pl. 51, figs. 5, 5a.
1932. *Cochlostyla (Chochlodryas) orbitula* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 337.

Shell subglobular, covered with a thin periostracum that seems to partake of the general color scheme characterizing the particular part of the shell covered. The coloration of the nuclear whorls consists of a white area covering the posterior half of the turns and a pale chestnut-brown area covering the rest of the exposed portion. Beginning with the postnuclear whorl, there is a rather broad, conspicuous, chestnut-brown band, which rapidly increases in intensity of coloration to chocolate-brown. This band occupies the middle of the exposed portion of all the turns. On the succeeding turns a pale green band appears halfway between the brown band and the summit. This band gradually widens until it extends to the median band of brown, leaving a big broad zone of white at the summit. A second green band appears immediately above the summit of the succeeding turn, and this also gradually widens posteriorly until it reaches the median brown band. Both the posterior and the anterior green bands become diluted as they approach the median band, the deepest shade of green being at the posterior extremity of the green band in the posterior zone and the peripheral extremity in the anterior band. The base is of an orange-brown color, paler within the aperture. There is a broad brown band a little wider and of a little darker shade than the median one of the spire, and this band is separated from the green zone at the periphery by a narrow zone of the ground color of the base. The columellar area is surrounded by a chocolate-brown band. The interior of the aperture, the outer lip, and the columella are white, the dark bands showing within the aperture. Nuclear whorls almost 2, well rounded, marked by incremental lines and on the last portion of the last turn by fine spiral striations. The postnuclear whorls are appressed at the summit, strongly rounded and marked by retractively slanting lines of growth and microscopic spiral striations on both spire and base. The periphery, although well rounded, gives one the impression of being obsoletely angulated, probably because of the color pattern. The base is short, inflated, and well rounded. The aperture is broadly oval and oblique, the outer lip being decidedly expanded and reflected. The columella is slightly excavated.

The specimen described and figured (U.S.N.M. no. 313624) has 5 whorls and measures: Length, 25.6 mm; greater diameter, 25.5 mm; lesser diameter, 22.3 mm. This and a large series of specimens were collected by Worcester and Bourns on the Menage Expedition somewhere in northeastern Mindoro. A hundred of them yield the following additional measurements:

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
313624	4.9	26.5	26.6	23.1
313624	4.9	26.5	26.0	23.1
313624	4.8	25.9	26.1	22.9
313624	5.1	25.0	23.7	20.8
313624	4.9	24.6	25.8	22.2
313624	5.1	28.3	27.7	24.7
313624	5.0	25.7	25.8	22.9
313624	5.1	23.9	24.0	21.6
313624	5.0	23.5	22.0	20.1
313624	4.9	24.5	24.2	21.9
313624	5.0	26.6	25.4	22.2
313624	5.1	26.6	25.7	22.6
313624	5.1	26.9	24.5	22.3
313624	4.5	23.8	26.9	22.9
313624	4.8	25.0	25.8	22.6
313624	4.9	26.8	26.1	23.1
313624	5.1	27.2	26.6	23.3
313624	5.2	28.0	25.5	22.9
313624	5.2	29.7	25.0	23.5
313624	5.2	26.3	24.7	22.5
313624	4.9	26.2	26.0	23.0
313624	4.8	22.3	23.9	20.8
313624	4.8	23.7	24.2	21.3
313624	5.0	25.3	24.4	22.2
313624	5.0	26.5	25.0	22.0
313624	4.9	24.6	24.8	21.3
313624	5.1	28.7	26.2	23.4
313624	5.1	25.2	25.5	22.3
313624	5.1	28.2	26.1	23.0
313624	5.1	25.9	25.9	22.1
313624	4.9	25.7	25.2	22.9
313624	5.1	26.7	25.8	22.3
313624	5.0	26.4	24.2	21.9
313624	5.2	27.2	25.3	22.3
313624	5.1	26.0	27.3	24.0
313624	4.7	25.0	23.8	21.2
313624	4.9	25.6	25.9	22.1
313624	5.0	23.9	23.9	21.0
313624	4.9	24.8	26.1	22.6
313624	4.9	25.5	27.1	22.9
313624	5.1	27.1	25.2	22.8
313624	5.1	25.6	26.2	23.6
313624	4.6	23.6	25.3	22.4
313624	4.9	26.7	27.3	24.1
313624	4.8	23.8	24.3	21.5
313624	4.9	25.3	24.8	22.0
313624	5.0	26.7	26.1	23.4
313624	4.6	22.9	24.2	22.1
313624	5.0	26.9	25.9	22.7
313624	4.7	26.3	26.9	23.8
313624	5.1	25.3	22.9	29.9

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
313624.....	4.8	22.3	24.2	22.2
313624.....	5.1	26.6	25.0	22.7
313624.....	4.7	24.4	25.3	22.3
313624.....	5.0	25.3	27.0	24.2
313624.....	5.0	21.0	22.1	20.5
313624.....	5.0	26.9	25.5	22.7
313624.....	5.0	24.6	23.5	20.6
313624.....	4.7	24.3	24.2	21.0
313624.....	4.9	24.8	23.4	21.3
313624.....	4.3	22.5	23.3	20.9
313624.....	4.5	22.9	24.8	21.8
313624.....	5.0	24.4	23.9	21.5
313624.....	4.9	24.9	25.3	22.1
313624.....	4.8	25.5	24.9	22.1
313624.....	4.7	25.1	25.4	23.1
313624.....	4.9	26.2	25.6	22.7
313624.....	5.0	26.8	26.5	23.3
313624.....	4.9	25.6	26.7	23.4
313624.....	4.5	22.7	24.6	21.4
313624.....	4.9	25.9	26.0	23.2
313624.....	4.9	23.7	24.6	22.0
313624.....	4.8	23.8	25.5	22.4
313624.....	4.7	21.2	22.2	19.5
313624.....	4.7	24.6	24.0	21.0
313624.....	4.7	24.0	23.4	21.6
313624.....	4.8	24.8	26.8	23.2
313624.....	5.1	27.2	26.0	22.7
313624.....	5.0	24.8	25.1	22.4
313624.....	5.0	24.9	24.8	22.3
313624.....	5.4	25.9	26.3	23.2
313624.....	5.0	25.8	26.4	23.0
313624.....	5.0	24.5	25.3	23.3
313624.....	4.7	21.1	22.6	20.3
313624.....	5.0	26.3	25.9	22.6
313624.....	4.7	25.4	26.2	22.7
313624.....	4.9	26.0	25.8	23.5
313624.....	5.0	25.0	22.7	21.5
313624.....	5.0	23.8	23.9	21.0
313624.....	4.9	24.2	24.0	21.3
313624.....	5.0	27.3	27.5	23.7
313624.....	4.7	25.4	25.8	23.9
313624.....	5.0	23.7	23.5	20.8
313624.....	4.4	21.3	24.0	21.3
313624.....	4.6	26.0	26.8	23.4
313624.....	5.0	26.2	24.8	22.0
313624.....	5.0	28.3	25.9	23.7
22003.....	4.9	24.3	24.0	21.6
104371.....	5.1	25.4	21.5	20.4
104371.....	5.1	26.6	25.2	23.0
Average.....	4.92	25.29	25.105	22.4
Greatest.....	5.4	29.7	27.7	29.9
Least.....	4.3	21.0	21.5	19.5

In the huge series of specimens before me I find little variation. In some the zone between the periphery and the dark basal band is bridged by the anterior green band. The base also varies somewhat in intensity of coloration.

COCHLOSTYLA (COCHLODRYAS) MATEOI Bartsch

1932. *Cochlostyla (Cochlodryas) mateoi* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 337.

Shell subglobular. The nuclear whorls white or pale brown, depending upon the subspecies in question. The postnuclear whorls are marked by a broad median brown band and a broad brown band of the same shade at some little distance below the periphery. The columellar area may or may not be dark. On the last whorl there is usually a greenish band near the summit, and the base, with the exception of the brown band referred to above, is green or greenish. This green color is usually intensified at the periphery, where it assumes the strength of a terminal band. The interior of the aperture is white, showing the dark bands within. The peristome and columella are also white. Nuclear whorls about 2, flattened, well rounded, marked by retractively slanting axial riblets and the last one by fine, closely spaced, spiral striations. The postnuclear whorls are almost flattened, well rounded, appressed at the summit, and marked by retractively slanting lines of growth and microscopic spiral striations, which are closely spaced and present on both spire and base. The suture is moderately constricted; the periphery inflated and strongly rounded; base moderately long, inflated and rounded; the aperture is subcircular; the outer lip broadly expanded and reflected. The columella is moderately broad, reflected over the base as a white callus. A thin callus covers the parietal wall. This species, formerly known as *tenera*, is distributed over eastern Mindoro and is present on some of the islands lying southeast of Mindoro.

The following key will help distinguish the forms:

KEY TO THE SUBSPECIES OF COCHLOSTYLA (COCHLODRYAS) MATEOI

Green coloration intense..... **mateoi**
 Green coloration not intense, but pale..... **sibolonensis**

COCHLOSTYLA (COCHLODRYAS) MATEOI MATEOI Bartsch

PLATE 99, FIGURES 7, 8

1841. *Helix (Cochlogena) tenera* SOWERBY, Proc. Zool. Soc. London, 1840, p. 102; not *Helix tenera* Gmelin, Systema naturae, ed. 13, vol. 1, pt. 6, p. 3653, 1791, nor *Helix tenera* Hartmann, Neue Alpina, p. 232, 1821.
 1842. *Helix tenera* PFEIFFER, Symbolae, vol. 2, p. 40.
 1848. *Helix tenera* PFEIFFER, Monographia heliceorum viventium, vol. 1, p. 228; in part.
 1850. *Helix tenera* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, ed. 2, vol. 1, Abt. 12, Theil 1, pp. 293-294, pl. 49, fig. 12.
 1850. *Helicostyla tenera* ALBERS, Die Heliceen, ed. 1, p. 104.
 1851. *Helix tenera* REEVE, Conchologia iconica, pl. 16, fig. 62c.
 1853. *Helix tenera* PFEIFFER, Monographia heliceorum viventium, vol. 3, p. 174.
 1855. *Helicostyla tenera* H. and A. ADAMS, The genera of recent Mollusca, vol. 2, p. 102.

1859. *Helix tenera* PFEIFFER, Monographia heliceorum viventium, vol. 4, p. 199.
1860. *Helicostyla tenera* MARTENS, Albers, Die Heliceen, ed. 2, p. 175.
1868. *Helix tenera* PFEIFFER, Monographia heliceorum viventium, vol. 5, p. 268.
1876. *Helix tenera* PFEIFFER, Monographia heliceorum viventium, vol. 7, p. 308.
1877. *Cochlostyla tenera* SEMPER, Reisen im Archipel der Philippinen, pt. 2, vol. 3, p. 195.
1887. *Cochlostyla tenera* HIDALGO, Journ. Conchyl., vol. 35, p. 143.
1892. *Cochlostyla tenera* PILSBRY, Man. Conch., ser. 2, vol. 7, pp. 179-180, pl. 36, fig. 31.
1895. *Helicostyla tenera* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 225.
1897. *Cochlostyla tenera* HIDALGO, Journ. Conchyl., vol. 44, pp. 260, 320, 331, 332, 341, 351.
1901. *Cochlostyla tenera* HIDALGO, Obras malacologicas, pp. 462-463 (in part), pl. 38, fig. 4; pl. 50, figs. 1, 2; pl. 53, fig. 3.
1911. *Cochlostyla* (*Cochlodryas*) *tenera* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 250-251 (in part), pl. 51, figs. 6, 6a.
1932. *Cochlostyla* (*Cochlodryas*) *mateoi* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 337.

Shell subglobular. Nuclear whorls 2. The posterior half of the nuclear turns is pale brown, while the anterior half is white. On the postnuclear whorls a dark spiral band about halfway between the periphery and summit of the whorls encircles the turns. This band becomes on the early whorls bright chestnut-brown, while on the last it deepens to dark chocolate-brown. A similarly colored band of about the same width is present a little anterior to the periphery on the base. In addition to this there is a narrow pale-green zone separated from the summit by a narrow white thread, and another of equal intensity is present on the periphery. The columellar area may be brown or this element may be absent. In the specimens before me about two-thirds have the brown markings. The base is of a paler olivaceous-green. The interior of the aperture, the peristome, and the columella are white, the dark bands showing within the aperture. Nuclear whorls well rounded, smooth except for incremental lines and fine spiral striations on the last part of the last turn. The postnuclear whorls are slightly inflated, well rounded, appressed at the summit, and marked by strongly retractorily slanting lines of growth and microscopic spiral striations. This sculpture also characterizes the base. Periphery well rounded. The base is short, somewhat inflated, and strongly rounded. The aperture is broadly oval; peristome expanded and reflected; the columella is slightly excavated.

The specimen described and figured (U.S.N.M. no. 313627) was collected by Worcester and Bourns on the Menage Expedition in northeastern Mindoro. It has 5 whorls and measures: Length, 27 mm; greater diameter, 25.5 mm; lesser diameter, 23.2 mm.

One hundred additional specimens (U.S.N.M. no. 313626) from the same source, taken at random, yield the following measurements:

Number of whorls	Length	Greater diameter	Lesser diameter
	<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
4.7 -----	22.9	25.0	21.5
5.2 -----	25.8	23.7	21.0
4.9 -----	24.0	25.5	21.6
5.0 -----	23.4	23.5	20.4
5.0 -----	23.1	23.3	20.7
5.0 -----	22.8	24.2	20.7
4.9 -----	21.9	23.1	20.2
4.9 -----	24.3	26.2	22.3
4.8 -----	22.9	23.3	20.2
5.3 -----	26.8	24.0	21.8
4.5 -----	20.4	23.0	20.1
5.0 -----	23.9	24.2	20.7
5.1 -----	24.0	24.4	21.8
5.1 -----	25.6	25.4	21.6
4.8 -----	21.7	24.8	21.0
4.9 -----	24.0	24.2	20.8
5.1 -----	23.9	23.5	20.6
4.9 -----	24.9	25.0	21.2
4.6 -----	19.2	21.3	19.0
4.8 -----	20.3	21.4	18.1
5.0 -----	25.0	24.8	21.7
4.9 -----	22.1	23.8	20.4
5.1 -----	26.5	25.8	23.2
4.8 -----	22.4	24.2	20.8
5.1 -----	26.9	26.4	22.1
4.6 -----	21.6	24.9	21.2
5.1 -----	27.2	27.3	23.4
4.9 -----	25.0	26.6	22.6
4.8 -----	24.6	24.0	21.4
5.0 -----	20.3	22.2	19.2
4.5 -----	18.4	20.7	18.1
4.9 -----	24.8	25.2	21.4
5.0 -----	22.8	25.3	21.8
4.6 -----	21.2	23.9	20.9
5.0 -----	22.2	24.3	20.5
5.0 -----	25.3	25.4	21.8
4.3 -----	18.1	21.0	18.8
4.8 -----	22.9	23.1	19.9
5.0 -----	23.3	23.2	20.4
5.0 -----	22.8	24.5	21.5
5.0 -----	23.2	24.9	21.5
4.6 -----	20.8	23.4	20.2
4.5 -----	21.2	24.3	21.0
4.6 -----	22.2	24.2	21.3
5.0 -----	23.7	23.9	20.3
5.0 -----	23.9	24.8	20.9
5.1 -----	23.8	24.5	21.4
4.7 -----	22.3	22.8	19.9
5.0 -----	22.5	25.5	21.5
5.0 -----	23.4	24.6	20.8
5.0 -----	23.5	23.9	21.3
5.0 -----	22.4	23.0	20.2
5.2 -----	21.9	23.8	20.2
5.0 -----	22.7	23.7	20.7
5.0 -----	22.6	23.2	20.2
5.0 -----	24.0	24.4	21.4
5.0 -----	21.8	24.5	21.3
4.9 -----	24.2	24.2	21.2
4.7 -----	23.6	26.4	22.0
4.8 -----	22.3	22.8	20.1
5.0 -----	23.0	24.6	20.7

Number of whorls	Length	Greater diameter	Lesser diameter
	Mm	Mm	Mm
4.7	22.2	25.2	21.9
4.9	23.3	24.9	21.0
5.1	22.3	21.6	20.4
5.1	25.6	25.1	22.0
5.0	22.7	23.2	20.9
4.9	23.0	25.6	21.4
5.0	21.5	22.2	19.7
5.1	26.5	28.2	24.0
5.0	24.2	25.0	21.0
5.1	26.5	25.4	22.6
4.9	22.4	22.3	19.7
4.9	23.6	24.8	21.5
5.1	26.4	25.4	22.2
4.9	25.2	26.8	22.7
4.7	22.2	24.5	21.1
5.0	23.0	23.3	20.3
4.8	22.2	23.7	20.3
5.0	23.8	25.3	21.7
4.7	21.2	23.3	20.1
5.1	24.2	25.5	22.1
4.7	22.8	22.6	20.1
5.1	23.3	22.0	19.9
5.1	23.8	22.3	19.6
5.1	28.1	27.1	23.4
5.0	25.9	25.0	21.6
5.0	24.1	24.4	20.8
4.9	23.4	24.5	21.2
4.6	22.4	24.8	20.9
5.0	24.9	24.2	21.7
4.8	21.3	24.5	19.6
4.7	22.7	24.1	21.0
4.6	22.1	23.4	20.4
5.1	25.2	24.8	21.8
5.0	25.1	25.2	22.0
5.1	25.8	25.3	22.1
5.0	24.7	26.3	21.8
5.1	24.7	24.2	21.2
5.0	25.5	25.9	22.0
5.1	25.2	25.7	22.6
4.92 ¹	¹ 23.4	¹ 24.3	¹ 21.05
5.3 ²	² 28.1	² 28.2	² 24.0
4.3 ³	³ 18.1	³ 20.7	³ 18.1

¹ Average.² Greatest.³ Least.

COCHLOSTYLA (COCHLODRYAS) MATEOI SIBOLONENSIS Bartsch

PLATE 99, FIGURE 9

1932. *Cochlostyla (Cochlodryas) mateoi sibolonensis* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 337.

Shell very thin, semitranslucent. The nuclear whorls white, except the last turn, which is covered by a very pale greenish periostracum. As in the typical race, we have here two brown bands of about equal

width encircling the turns. One of these is almost on the middle between the suture and summit, and the other one is about the same distance below the periphery on the base. Interior of the aperture, expanded peristome, and columella white. The band on the middle of the turns extends to the nuclear whorl, slowly fading posteriorly. Nuclear whorls 2, well rounded, marked by incremental lines and the last half of the last turn by fine spiral striations. The postnuclear turns are inflated, well rounded, appressed at the summit, and marked by retractively slanting lines of growth and numerous microscopic spiral striations, which are stronger on the first postnuclear turn than on the rest and quite feeble on the base. Aperture almost subcircular; the peristome of the outer lip expanded and reflected; columella rather slender, slightly excavated.

The type (U.S.N.M. no. 313629), collected by C. Canonizado at Sibolon Island, Mindoro, has 5.3 whorls and measures: Length, 27.2 mm; greater diameter, 26.1 mm; lesser diameter, 22.2 mm.

Three of the other five specimens (U.S.N.M. no. 313630) are adult. They have the following measurements:

Number of whorls	Length	Greater diameter	Lesser diameter
	<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
5.0-----	25. 5	23. 8	21. 2
4.9-----	23. 5	25. 2	22. 2
4.8-----	20. 7	23. 5	21. 2

This race can readily be distinguished from typical *Cochlostyla* (*Cochlodryas*) *mateoi mateoi* by its very thin shell and broader form, as well as paler coloration.

COCHLOSTYLA (COCHLODRYAS) MATEOI, subspecies (?)

1851. *Helix tenera* REEVE, *Conchologia iconica*, pl. 16, fig. 62a.
 1896. *Cochlostyla tenera* ELERA, *Catalogo sistematico de toda la fauna de Filipinas*, vol. 3, p. 585; in part.
 1901. *Cochlostyla tenera* HIDALGO, *Obras malacologicas*, pp. 462-463 (in part), pl. 118, fig. 4.
 1911. *Cochlostyla* (*Cochlodryas*) *tenera* MÖLLENDORFF, KOBELT, and WINTER, *Semper's Reisen im Archipel der Philippinen*, vol. 10, pp. 250-251 (in part), pl. 51, figs. 7, 7a.

Reeve and Hidalgo figured a specimen that has a bright buff peripheral band and an almost black band immediately posterior to this and anterior to it. I have not seen specimens with this coloration. It is possible that this may represent a distinct race, but I call it merely *mateoi* subspecies (?). I am copying their figures.

COCHLOSTYLA (COCHLODRYAS) FASTIDIOSA Bartsch

PLATE 99, FIGURE 5

1840. *Helix* (*Cochlogena*) *tenera* SOWERBY, Proc. Zool. Soc. London, 1840, p 102; not *Helix tenera* GMELIN, Systema naturae, ed. 13, vol. 1, pt. 6, p. 3653, 1791, nor *Helix tenera* HARTMANN, Neue Alpina, p. 232, 1821.
1850. *Helix tenera* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, ed. 2, vol. 1, Abt. 12, Theil 1, pp. 293-294 (in part), pl. 49, fig. 13.
1851. *Helix tenera* REEVE, Conchologia iconica, pl. 16, fig. 62b.
1892. *Cochlostyla tenera* PILSBRY, Man. Conch., ser. 2, vol. 7, pp. 179-180, pl. 36, fig. 32.
1897. *Cochlostyla tenera* HIDALGO, Journ. Conchyl., vol. 44, pp. 260, 320, 331, 332, 341, 351.
1901. *Cochlostyla tenera* HIDALGO, Obras malacologicas, pp. 462-463 (in part), pl. 38, fig. 5.
1932. *Cochlostyla* (*Cochlodryas*) *fastidiosa* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 337.

Shell varying in shape from helicoid to subglobular. Perfect specimens are covered with a thin translucent periostracum, which contributes largely to the coloration of the shell. The nucleus and the first $1\frac{1}{2}$ postnuclear whorls are white; the remaining turns also have a basal white ground color, but there is a narrow band of pale grass green separated from the summit by a little narrow white thread. The base also is pale grass green, and this color terminates anteriorly in an intensification of this color in the shape of a moderately broad zone at the periphery. The aperture, peristome, and columella are white. The base too has spiral lines a little darker than the rest. Nuclear whorls 2.2, well rounded, marked by lines of growth, and the last half of the last turn bears within numerous closely spaced spiral striations. The postnuclear whorls are inflated, well rounded, appressed at the summit, and marked by retractively curved lines of growth and numerous closely spaced spiral striations both on spire and base. Periphery well rounded. The base is short, inflated, and well rounded. The aperture is broadly oval; peristome expanded and reflected. The columella is somewhat excavated. Parietal wall covered by a thin translucent callus.

The specimen described and figured (U.S.N.M. no. 313640), collected by Dean C. Worcester and Bourns on the Menage Expedition somewhere in northeastern Mindoro, has 5.1 whorls and measures: Length, 27.8 mm; greater diameter, 26.3 mm; lesser diameter, 22.7 mm.

We have a large series of specimens (U.S.N.M. no. 313641) from the same source, a hundred of which yield the following additional measurements:

Number of whorls	Length	Greater diameter	Lesser diameter
	<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
4.6-----	24.0	25.1	21.8
4.7-----	23.2	25.4	21.7
4.8-----	22.2	25.1	21.7
5.1-----	24.5	23.3	21.0
4.6-----	21.4	22.6	19.8
4.7-----	22.2	24.3	20.3
5.0-----	25.4	25.9	23.0
5.1-----	23.0	25.1	21.9
5.1-----	26.5	26.8	22.5
5.0-----	22.6	26.6	22.0
4.8-----	23.9	24.5	21.3
4.7-----	24.0	26.5	23.0
4.7-----	23.5	25.7	21.7
5.0-----	26.3	25.6	22.9
5.0-----	25.8	25.8	22.6
5.0-----	27.2	24.1	21.8
5.1-----	23.9	24.6	21.3
5.0-----	25.1	26.9	23.3
5.2-----	29.5	27.8	23.9
5.3-----	27.0	26.6	22.7
5.2-----	25.2	26.0	23.0
4.8-----	27.4	27.1	24.4
4.9-----	24.0	23.4	20.3
4.9-----	24.2	26.8	21.8
5.4-----	27.2	26.6	23.0
4.9-----	25.3	25.4	21.4
5.1-----	25.3	25.0	22.3
5.2-----	27.8	26.4	22.4
4.6-----	21.6	23.3	20.3
5.0-----	25.1	25.3	21.9
5.1-----	25.4	24.5	21.2
4.8-----	23.7	24.8	22.1
4.6-----	22.0	24.5	21.4
5.1-----	24.5	25.2	21.3
5.1-----	24.9	23.1	20.6
5.0-----	24.8	25.9	22.4
5.0-----	24.8	23.3	20.1
4.9-----	24.9	24.8	22.1
4.8-----	25.4	24.8	21.8
4.9-----	23.8	25.2	21.5
5.2-----	25.2	24.3	22.1
4.6-----	21.4	23.0	19.7
5.0-----	25.2	26.3	22.5
5.1-----	25.5	22.4	20.2
5.0-----	24.4	25.2	22.3
4.7-----	22.8	23.6	21.7
4.8-----	23.3	24.1	21.6
5.1-----	26.1	27.8	23.8
5.0-----	25.9	26.1	21.9
4.9-----	22.4	23.8	20.3
5.4-----	27.8	25.0	22.1
4.6-----	20.7	24.3	20.8
5.0-----	24.2	26.5	22.7
5.3-----	24.2	24.8	22.1
5.0-----	21.1	23.2	20.0
4.9-----	24.8	25.4	22.0
4.8-----	24.8	25.2	22.0
4.8-----	22.1	25.2	22.5
5.0-----	25.6	26.9	23.4
4.9-----	25.5	26.3	22.8
5.0-----	24.0	26.0	21.7
5.4-----	26.9	25.3	22.4

Length of Antenna	Length	Length of Cephalopod	Length of Cephalopod
	<i>Male</i>	<i>Male</i>	<i>Male</i>
4.9	24.2	23.1	23.7
4.7	23.5	24.9	21.1
4.6	23.7	23.9	20.3
4.8	22.2	23.3	20.3
5.1	24.0	22.6	20.9
5.0	25.9	25.6	21.9
5.0	26.8	26.0	23.0
5.0	28.2	24.1	23.7
5.1	27.1	26.3	23.3
4.6	21.9	23.0	20.2
5.0	25.6	22.8	20.5
5.0	26.4	24.8	22.7
5.0	24.8	26.5	22.4
4.8	26.8	25.8	23.3
4.9	24.3	26.7	22.9
5.3	23.8	24.3	21.5
4.9	25.3	25.3	22.3
4.7	23.3	26.3	22.6
5.0	22.3	24.3	21.3
4.6	23.6	25.6	22.0
4.6	21.6	23.6	20.6
5.1	23.6	23.3	20.4
4.6	23.7	23.3	20.5
4.9	24.5	25.3	22.0
5.1	26.3	26.1	22.7
5.2	22.1	23.3	21.2
4.4	21.9	24.4	20.2
5.0	24.4	24.3	21.6
5.0	25.3	26.1	21.9
4.9	24.3	26.3	22.3
5.1	25.3	26.0	23.1
5.0	23.9	25.7	21.9
4.5	22.1	26.3	21.3
4.6	23.2	24.3	21.3
4.3	21.3	24.6	21.0
5.2	26.3	25.2	22.1
4.6	23.3	23.3	20.6
4.6	21.7	24.2	20.3
4.92 ¹	24.525	25.15	21.29
5.4 ²	29.5	28.1	24.4
4.4 ³	20.7	22.4	19.7

¹ Average.² Greatest.³ Least.

Some specimens seem to be almost white, but even these show an indication of a peripheral and a subsutural green band.

The name originally proposed by Sowerby is not tenable since it was twice preoccupied, as shown in my synonymy. Sowerby too, and the authors who followed him, confused two species under this name, considering them mere color forms. Hundreds of specimens before me show no intergrades of one to the other and lead me to believe that the banded form, which has been passing under the name *Cochlostyla* (*Cochlodryas*) *tenera*, merits specific separation. This is indicated the more since races of it occur on some of the off-lying islands. I have therefore named the banded shell *Cochlostyla* (*Cochlodryas*) *matvei*, and of this I recognize a number of races.

COCHLOSTYLA (COCHLODRYAS) DECORA (Adams and Reeve)

PLATE 100, FIGURES 4, 5

1850. *Helix decora* ADAMS and REEVE, The zoology of the voyage of H. M. S. *Samarang*, p. 62, pl. 16, fig. 7.
1852. *Helix decora* REEVE, *Conchologia iconica*, pl. 105, fig. 586.
1853. *Helix decora* PFEIFFER, *Monographia heliceorum viventium*, vol. 3, p. 178.
1854. *Helix decora* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, ed. 2, vol. 1, Abt. 12, Theil 3, pp. 401-402, pl. 144, figs. 18, 19.
1855. *Acavus (Tachea) decorus* H. and A. ADAMS, The genera of recent Mollusca, vol. 2, p. 195.
1856. *Helix decora* PFEIFFER, *Malakozool. Blätter*, vol. 2, p. 145.
1859. *Helix decora* PFEIFFER, *Monographia heliceorum viventium*, vol. 4, p. 202.
1860. *Helicostyla decora* MARTENS, Albers, *Die Heliceen*, ed. 2, p. 175.
1863. *Helix decora* PFEIFFER, *Monographia heliceorum viventium*, vol. 5, p. 270.
1876. *Helix decora* PFEIFFER, *Monographia heliceorum viventium*, vol. 7, p. 578; in part.
1892. *Cochlostyla decora* PILSBRY, *Man. Conch.*, ser. 2, vol. 7, p. 133, pl. 52, figs. 23, 24.
1895. *Helicostyla decora* PILSBRY, *Man. Conch.*, ser. 2, vol. 9, p. 122.
1897. *Cochlostyla decora* HIDALGO, *Journ. Conchyl.*, vol. 44, pp. 278, 331, 340, 352.
1898. *Cochlostyla decora* MÖLLENDORFF, *Abh. Naturf. Ges. Görlitz*, vol. 22, p. 122; in part.
1904. *Cochlostyla decora* HIDALGO, *Obras malacologicas*, p. 470, pl. 48, fig. 4.
1910. *Cochlostyla decora* MÖLLENDORFF, KOBELT, and WINTER, *Semper's Reisen im Archipel der Philippinen*, vol. 10, p. 206; in part.
1932. *Cochlostyla (Cochlodryas) decora* BARTSCH, *Journ. Washington Acad. Sci.*, vol. 22, p. 337.

Shell imperforate, conoidal globose, pale straw color, covered with a fawn-colored epidermis, obliquely striated; whorls 4, rather flattened, the last faintly keeled; aperture lunar orbicular, white within, lip reflected, white, shining.

Habitat: Island of Mindoro, Philippines.

I have not seen specimens of this species. Von Möllendorff seems to think that he has recognized this species in shells from the Island of Romblon, but I am inclined to disagree with von Möllendorff. The fact that he did not rediscover it in Mindoro is not at all surprising, because little work has been done to date in the southwestern portion of Mindoro, and it is more than likely that when an ardent collector combs this part of the territory visited by the *Samarang*, the species will be rediscovered. This has been true of most of the shells that were originally stated to come from a locality or from an island, and whose names were later transferred to other races from other islands. I therefore prefer to copy Adams and Reeve's description and figure.

Subgenus STEATODRYAS Pilsbry

In this subgenus the shell is of inflated turbinate shape and rather thin. The whorls are many, inflated, strongly rounded, and closely

coiled. The surface is covered by a thin hydrophanous periostracum. The aperture is narrowly lunate. The columella is spirally twisted, the edge of the twist forming a sublamellar fold.

Type: *Cochlostyla* (*Steatodryas*) *cepoides* (Lea).

COCHLOSTYLA (STEATODRYAS) CEPOIDES (Lea)

PLATE 100, FIGURES 6-8

1840. *Helix cepoides* LEA, Proc. Amer. Phil. Soc., vol. 1, p. 174.
1841. *Helix* (*Helicostyla*) *cepoides* SOWERBY, Proc. Zool. Soc. London, [1840, p. 88.
1841. *Helix cepoides* LEA, Trans. Amer. Phil. Soc., new ser., vol. 7, p. 462, pl. 12, fig. 14.
1842. *Helix cepoides* REEVE, Conchologia systematica, vol. 2, p. 70, pl. 164, fig. 14.
1842. *Helix cepoides* PFEIFFER, Symbolae, vol. 2, p. 2.
1843. *Columpica dolium* HARTMANN, Erd- und Süßwasser-Gasteropoden der Schweiz, pp. 187-188, pl. 67, figs. 1, 2.
1848. *Helix cepoides* PFEIFFER, Monographia heliceorum viventium, vol. 1, p. 302.
1849. *Helix cepoides* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, ed. 2, vol. 1, Abt. 12, Theil 1, p. 268, pl. 41, figs. 3, 4.
1850. *Pachya dolium* ALBERS, Die Heliceen, ed. 1, p. 107.
1851. *Helix dolium* REEVE, Conchologia iconica, pl. 8, fig. 39.
1851. *Helix dolium* DESHAYES, Férussac's Histoire naturelle . . . mollusques . . . , vol. 1, p. 312, pl. 108B, figs. 1, 2.
1853. *Helix dolium* PFEIFFER, Monographia heliceorum viventium, vol. 3, p. 207.
1855. *Stylodonta dolium* H. and A. ADAMS, The genera of recent Mollusca, vol. 2, p. 187.
1856. *Helix dolium* PFEIFFER, Malakozool. Blätter, vol. 2, p. 139.
1859. *Helix dolium* PFEIFFER, Monographia heliceorum viventium, vol. 4, p. 241.
1860. *Stylodon dolium* MARTENS, Albers, Die Heliceen, ed. 2, p. 150.
1868. *Helix dolium* PFEIFFER, Monographia heliceorum viventium, vol. 5, p. 111.
1876. *Helix dolium* PFEIFFER, Monographia heliceorum viventium, vol. 7, p. 358.
1877. *Cochlostyla dolium* SEMPER, Reisen im Archipel der Philippinen, pt. 2, vol. 3, p. 181.
1886. *Nanina dolium* TRYON, Man. Conch., vol. 2, p. 26, pl. 6, figs. 86, 87.
1887. *Helix dolium* HIDALGO, Journ. Conchyl., vol. 35, p. 106.
1888. *Cochlostyla* (*Ptychostylus*) *cepoides* MÖLLENDORFF, Nachr. deutschen malakozool. Ges., vol. 20, pp. 73, 74.
1891. *Cochlostyla cepoides* PILSBRY, Man. Conch., ser. 2, vol. 6, p. 194, pl. 48, fig. 69.
1895. *Helicostyla cepoides* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 226.
1896. *Ptychostylus cepoides* ELERA, Catalogo sistematico de toda la fauna de Filipinas, vol. 3, p. 588.
1897. *Cochlostyla cepoides* HIDALGO, Journ. Conchyl., vol. 44, pp. 248, 270, 280, 331, 340, 351.
1898. *Cochlostyla cepoides* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 134.
1901. *Cochlostyla cepoides* HIDALGO, Obras malacologicas, pp. 352-353, pl. 44, figs. 3-5.
1912. *Cochlostyla* (*Columpica*) *cepoides* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 266-267, pl. 54, fig. 8.

1932. *Cochlostyla (Columpica) cepoides* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 337.
1932. *Steatodryas cepoides* PILSBRY, Nautilus, vol. 46, p. 72.

Shell semiglobose, turbinate, covered with a thin reddish-brown periostracum, which forms a subsutural band at the summit, in which whitish and darkish spots alternate, the lighter spots being occasioned by the periostracum. There is also a subperipheral hydrophanous spiral band present. The rest of the shell is reddish brown on the spire, tending toward olivaceous-yellow on the base. The interior

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
254554.....	6.3	36.7	46.6	39.7
254554.....	6.4	36.1	42.7	37.5
7596.....	7.4	50.9	51.4	46.0
7596.....	6.7	44.6	45.0	42.3
7596.....	7.2	40.0	46.5	42.4
313636.....	7.0	39.5	47.3	42.4
313636.....	7.1	41.0	46.3	42.5
313636.....	7.1	41.4	44.7	41.9
313636.....	7.0	48.9	43.0	38.1
195396.....	6.7	34.0	43.5	39.6
195396.....	7.0	40.0	44.8	41.3
195396.....	7.1	38.5	46.0	41.2
195396.....	7.3	41.7	46.0	40.9
208220.....	7.3	46.5	50.6	45.6
208220.....	7.0	41.2	52.7	45.9
103944.....	7.3	44.6	46.8	43.2
255946.....	7.2	48.3	48.7	44.5
255946.....	7.3	45.5	51.0	45.4
255946.....	6.3	37.3	42.6	38.0
255946.....	7.0	38.4	43.9	39.2
255946.....	6.6	38.8	45.0	39.8
255946.....	7.1	44.4	49.1	44.1
255946.....	6.8	40.7	46.0	40.7
255946.....	7.0	43.7	38.0	43.3
255946.....	7.0	43.1	47.1	43.3
255946.....	7.1	46.3	47.8	42.4
255946.....	7.0	40.3	44.4	41.0
255946.....	7.2	45.0	49.0	44.0
255946.....	6.9	44.2	46.0	41.4
255946.....	6.5	39.1	43.2	38.5
255496.....	7.4	48.4	48.6	43.7
255496.....	7.3	41.9	45.9	41.0
255496.....	7.0	41.9	48.4	43.7
255496.....	7.2	44.7	47.6	42.4
255496.....	6.9	40.7	42.0	38.5
255496.....	7.2	43.4	48.4	43.0
255496.....	6.7	40.1	43.8	39.3
254496.....	6.9	42.4	49.1	43.0
255496.....	7.2	42.8	45.9	40.8
309408.....	7.3	40.0	46.7	41.8
22010.....	7.0	43.0	47.1	42.5
309407.....	7.1	40.9	51.5	54.6
Average.....	7.0	42.16	46.44	41.93
Greatest.....	7.4	50.9	52.7	46.0
Least.....	6.3	34.0	38.0	38.0

of the aperture and columella are bluish white, while the outer lip is edged with pale brown. Nuclear whorls 1.6, well rounded, marked by lines of growth only. The postnuclear whorls are inflated, strongly rounded, and marked by retractorily slanting lines of growth and microscopic spiral striations, which are present on both spire and base. As the suture is strongly constricted, the shell has a turbinate appearance. Periphery well rounded. Base short, inflated, well rounded, narrowly perforated; aperture lunate, narrow; outer lip expanded and reflected; the columella with a strong twist, which gives it a toothlike appearance.

Lea's type was collected by Lt. W. W. Wood, and while the locality is given as Philippine Islands, we now know that the species is restricted to the Island of Lubang.

The type (U.S.N.M. no. 116392) has 7 whorls and measures: Length, 40.1 mm; greater diameter, 52 mm; lesser diameter 45.8 mm.

Additional specimens yield the measurements given in the foregoing table.

Subgenus *HELICOBULINUS* Broderip

In this subgenus the shell is large, globose-turbinate, and covered with a hydrophanous periostracum of widely varied color. The columella is more or less folded.

Type: *Cochlostyla (Helicobulinus) sarcinosa* (Férussac).

COCHLOSTYLA (*HELICOBULINUS*) *TURBO* (Pfeiffer)

PLATE 100, FIGURES 1, 2

1845. *Helix turbo* PFEIFFER, Proc. Zool. Soc. London, 1845, p. 64.
1848. *Helix turbo* PFEIFFER, Monographia heliceorum viventium, vol. 1, p. 220.
1849. *Helix turbo* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, ed. 2, vol. 1, Abt. 12, Theil 1, p. 286, pl. 48, figs. 1, 2.
1850. *Bulimus (Orthostylus) turbo* ALBERS, Die Heliceen, ed. 1, p. 136.
1851. *Helix turbo* REEVE, Conchologia iconica, pl. 19, fig. 81.
1851. *Helix turbo* DESHAYES, Férussac's Histoire naturelle . . . mollusques . . . , vol. 1, p. 318, pl. 110B, fig. 1.
1853. *Helix turbo* PFEIFFER, Monographia heliceorum viventium, vol. 3, p. 171; in part.
1855. *Cochlostyla turbo* H. and A. ADAMS, The genera of recent Mollusca, vol. 2, p. 142.
1856. *Helicobulinus turbo* PFEIFFER, Malakozool. Blätter, vol. 2, p. 145.
1859. *Helix turbo* PFEIFFER, Monographia heliceorum viventium, vol. 5, p. 205.
1860. *Cochlodryas turbo* MARTENS, Albers, Die Heliceen, ed. 2, p. 176.
1868. *Helix turbo* PFEIFFER, Monographia heliceorum viventium, vol. 5, p. 274.
1876. *Helix turbo* PFEIFFER, Monographia heliceorum viventium, vol. 7, p. 318.
1877. *Cochlostyla turbo* SEMPER, Reisen im Archipel der Philippinen, pt. 2, vol. 3, p. 195.
1887. *Cochlostyla turbo* HIDALGO, Journ. Conchyl., vol. 35, p. 139; in part.
1892. *Cochlostyla cinerascens turbo* PILSBRY, Man. Conch., ser. 2, vol. 7, pp. 197-198, pl. 47, fig. 9.

1895. *Helicostyla turbo* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 227.
 1896. *Cochlostyla turbo* ELERA, Catalogo sistematico de toda la fauna de Filipinas, vol. 3, p. 590; in part.
 1897. *Cochlostyla turbo* HIDALGO, Journ. Conchyl., vol. 44, pp. 253, 254, 272, 321, 330, 331, 332, 333, 341, 347, 351.
 1898. *Cochlostyla turbo* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 135; in part.
 1901. *Cochlostyla turbo* HIDALGO, Obras malacologicas, pp. 355-356; in part.
 1912. *Cochlostyla (Rhymbocochlias) turbo* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, p. 268; in part.
 1932. *Cochlostyla (Helicobulinus) turbo* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 337.

Shell imperforate, top-shaped, rather solid, obliquely distinctly striated, pale flesh-color, covered in part with a thin evanescent yellow periostracum. Spire regularly conic, gradually tapering toward the obtuse apex. Whorls 5, flat, the last rather large, angulated at the periphery, where it is marked by a chestnut-brown band. The base slopes conspicuously from the periphery, which is only slightly arched. The columella is almost vertical, straight, broad, flat, and white. The aperture is almost diagonal to the axis of the shell and is of irregular lunate form, pearly white within. The peristome is somewhat expanded and reflected backward at its junction with the columella, forming there a small rimation.

Length, 35 mm; greater diameter, 43 mm.

Habitat: Island of Mindoro.

Of the figure that Pfeiffer published in Martini-Chemnitz Conchylien Cabinet, p. 287, pl. 48, figures 1 and 2, which we here reproduce, he says: "The notch which the artist who drew the figure reproduced all too accurately in his drawings is merely an accidental monstrosity."

I have not seen this species.

Subgenus ORHOSTYLUS Beck

In this subgenus the shell is large, solid, and ovate-conic. It is covered with a hydrophanous periostracum that presents much variation in thickness and color in the different species of the group. The aperture is ovate and oblique and the peristome moderately expanded and reflected. The columella is almost vertical and more or less folded.

Type: *Cochlostyla (Orthostylus) pithogaster* (Férussac).

COCHLOSTYLA (ORTHOSTYLUS) EUCONICA Bartsch

PLATE 100, FIGURE 3

1932. *Cochlostyla (Orthostylus) euconica* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 337.
 1933. *Helicostyla (Orthostylus) pithogaster* CLENCH and ARCHER, Papers Michigan Acad. Sci., Arts, Letters, vol. 17, p. 543.

Shell broadly conic, covered by a thin periostracum, which varies from grayish brown to wood brown. When the periostracum is removed from the earlier turns, they are shown to be flesh color or flesh color with a pinkish brown tint, the succeeding turns becoming gradually darker until the last one is bright chestnut-brown between the periphery and summit and bright dark chestnut-brown on the base. The interior of the aperture is bluish white, and the peristome is edged with brown; the columella has a pinkish cast. Nuclear whorls 1.5, well rounded, marked only by lines of growth. The postnuclear turns are moderately rounded, appressed at the summit, and marked by retractively slanting lines of growth, which are a little stronger on the last turn than on the early whorls, and also by microscopic closely crowded spiral striations, which are present on both spire and base. Suture moderately constricted; periphery of the last whorl obsoletely angulated. The base is short, somewhat inflated, and strongly rounded. The aperture is almost circular, oblique; outer lip slightly expanded and reflected. The columella is moderately broad, slightly excavated, and reflected at its insertion over the base, and the parietal wall has a moderately thick callus.

The type (U.S.N.M. no. 313637) was collected by Pedro de Mesa on Mount Sapol, Calapan, Mindoro. It has 5.7 whorls and measures: length, 50.3 mm; greater diameter, 39.2 mm; lesser diameter, 34 mm.

Two topotypes (U.S.N.M. no. 313638), from the same source, yield, respectively, the following measurements: 5.7 whorls each; length, 52.3 and 51.8 mm; greater diameter, 39.5 and 40 mm; lesser diameter, 34.7 mm each.

This species belongs to the group of *Cochlostyla* (*Orthostylus*) *pithogaster*, not treated in this paper. It is a group much in need of revision, for the name *Cochlostyla pithogaster* has been used as a catch-all. In order thoroughly to understand its relationship to the other members of the group, it would be necessary to revise the group, which is not within the province of the present paper.

Subgenus HYPSELOSTYLA Martens

In this subgenus the shell is elongate-ovate to conic, imperforate, with more or less keeled periphery, and covered with a thin hydropheous periostracum. The aperture is oval to subquadrate, and the peristome is but slightly expanded and reflected.

Since no type appears to have been definitely designated for the group, I now select *Cochlostyla* (*Hypselostyla*) *nympha* (Pfeiffer), one of the two species mentioned by von Martens.

COCHLOSTYLA (HYPSELOSTYLA) CININNIFORMIS (Sowerby)

Shell ovate-conic, usually rather thin, never ponderous, covered with a thin periostracum, which in the various races varies from pale

straw color through yellow and pale orange-brown to grayish brown. The color of the shell from which the periostracum has been removed may be completely white. In all the specimens before me, regardless of the race involved, except *Cochlostyla* (*Hypselostyla*) *cincinniformis lubanensis*, there is an indication of a dark columellar area on the base. The intensity of this coloration varies from pale brown to almost black. A peripheral dark zone is also present and is even indicated weakly in *lubanensis*. The extent of this peripheral zone varies in the different races; sometimes it constitutes a narrow line, while in other races it forms a broad band, and the intensity of coloration is also variable. In some of the races it is very pale brown, while in others it is almost black. What I have said of the peripheral band applies also to the dark band at the summit, which is present in all the races and almost obsolete in *lubanensis*. As a rule the intensity of coloration expressed, whether pale or dark, holds good for all the dark zones, whether circumbilical, peripheral, or the band at the summit. The light zones between the dark bands vary in intensity from white to flesh color to pale straw color to pale orange-brown. The nuclear whorls in most of the races are white; in some, however, they are dark, and it will be interesting to see whether the dark-tipped and light-tipped forms represent elements taken from the same colony (that is, stock) or distinct colonies.

The distribution of the species extends from Cabra Island on the north through Lubang, Golo Island, to northern Mindoro, breaking up into local races, several of which are present on Lubang.

KEY TO THE SUBSPECIES OF COCHLOSTYLA (HYPSELOSTYLA) CINCINNIFORMIS

Columellar area of base with brown patch.

Light area of base cinnamon-rufous.

Dark bands of base and spire cinnamon-rufous.....ultima

Dark bands of base and spire not cinnamon-rufous.

Dark bands of base and spire brownish black.....demesana

Light area of base not cinnamon-rufous.

Light area of base flesh-color.....menagei

Light area of base not flesh-color.

Light area of base straw-color or yellowish orange.

Shell rather slender.....cincinniformis

Shell rather stout.

Whorls well rounded.....guntingana

Whorls flattened.....cabrasensis

Columellar area of base without brown patch.....lubanensis

COCHLOSTYLA (HYPSELOSTYLA) CINCINNIFORMIS ULTIMA (Clench and Archer)

PLATE 101, FIGURE 2

1931. ⁷⁷*Helicostyla cincinniformis ultima* CLENCH and ARCHER, Occ. Papers Boston Soc. Nat. Hist., vol. 5, pp. 335-336, pl. 17, fig. 4.

1932. *Cochlostyla* (*Hypselostylus*) *cincinniformis ultima* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 337.

Shell broadly ovate-conic. Early whorls white. The early post-nuclear whorls show a reddish-brown band at the summit that increases in intensity as the shell progresses in size, but even on the last turn it is but pale brown. There is also a fairly broad peripheral zone of brown, which shows in the suture on the last two whorls. This band is flanked posteriorly and anteriorly by a reddish-brown suffusion, which on the base sometimes extends almost entirely over it. The umbilical area is likewise marked with a zone of reddish brown corresponding in intensity with the peripheral band. The band at the summit and at the periphery and on the base of the last turn shows axial hydrophanous lines, which give a somewhat vertebrated appearance to the band at the summit and the periphery. The interior of the aperture and columella is bluish white, while the outer lip is edged with brown. Nuclear whorls about 2, well rounded, marked by lines of growth only. The postnuclear whorls are slightly rounded and marked by rather strong retractorily curved lines of growth, which assume almost a threadlike appearance. They become somewhat enfeebled on the base. In addition to this the entire surface of the shell is marked by fine, closely spaced, spiral striations.

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
313584.....	6.0	37.4	27.4	24.4
313584.....	5.8	37.0	27.0	24.2
313584.....	5.3	34.9	26.2	23.4
313584.....	5.4	34.0	25.6	22.6
313584.....	5.6	37.4	27.3	23.9
313584.....	5.5	31.7	23.3	21.3
313584.....	5.9	37.4	26.7	23.4
313584.....	5.5	30.9	26.0	22.4
313584.....	5.5	35.3	26.4	24.8
313584.....	5.5	35.4	25.7	23.2
313584.....	5.6	34.8	23.8	22.2
313584.....	5.5	35.4	26.7	23.6
313584.....	5.1	31.3	25.4	22.1
313584.....	5.4	36.0	27.0	24.1
313583.....	5.1	34.2	25.6	23.7
313583.....	5.8	36.0	26.5	23.1
313583.....	5.2	33.8	24.8	22.7
313583.....	5.5	36.9	26.0	23.0
313583.....	5.6	40.2	27.4	24.8
313583.....	5.1	31.4	24.2	22.0
313583.....	5.2	34.3	26.3	23.5
313583.....	5.6	35.2	25.8	22.4
313583.....	5.4	33.4	24.7	22.7
313583.....	5.6	36.0	26.4	24.1
313583.....	5.5	36.6	25.8	22.9
313583.....	5.6	38.2	27.3	23.9
313583.....	5.9	37.4	26.6	24.3
Average.....	5.5	35.28	26.0	23.3
Greatest.....	6.0	40.2	27.4	24.8
Least.....	5.1	30.9	23.3	21.3

Suture moderately constricted. Periphery of the last whorl obsoletely angulated. Base moderately long, inflated, well rounded. Aperture almost subquadrate, slightly oblique. Outer lip narrowly expanded and reflected. Columella only moderately broad with a twist on its anterior third.

The specimen described and figured (U.S.N.M. no. 104378) is one of a series of specimens presented to the United States National Museum by Pedro de Mesa, who collected them on Golo Island. It has 5.5 whorls and measures: Length, 37.9 mm; greater diameter, 27.2 mm; lesser diameter, 24.4 mm.

The rest of the collection furnishes the data given in the foregoing table.

This race is easily distinguished from the other members by its peculiar reddish-brown banding.

COCHLOSTYLA (HYPSELOSTYLA) CINCINNIFORMIS DEMESANA (Clench and Archer)

PLATE 101, FIGURE 11

1931. *Helicostyla cincinniformis demesana* CLENCH and ARCHER, Occ. Papers Boston Soc. Nat. Hist., vol. 5, p. 336, pl. 17, fig. 5.
 1932. *Cochlostyla (Hypselostylus) cincinniformis demesana* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 337.

Shell elongate-ovate. Nuclear whorls dark; the postnuclear turns are marked by a broad band of brown at the summit and another at the periphery, and a dark area about the umbilical region. These bands are beautifully marked by axial hydrophanous lines of a pale buff color, which give to the sutures a distinctly vertebrated aspect. On the last whorl an orange-brown suffusion extends posteriorly from the peripheral blackish-brown band and also anteriorly, almost covering, in fact completely so at the lip, the light zone between the dark umbilical area and the peripheral band where the periostracum is present; this also seems to be tinged with the basal color although it likewise has a golden-buff sheen. The interior of the aperture is pearly gray, and the outer lip and the base of the columella are pale brown. The spiral dark bands show inconspicuously within the aperture, though they are readily perceived. Nuclear whorls almost 2, well rounded, marked only by lines of growth. The postnuclear whorls are well rounded, appressed at the summit, and marked by retractively slanting lines of growth, which are crossed by numerous, closely spaced, microscopic spiral striations on both spire and base. The suture is moderately constricted and the periphery obsoletely angulated. The aperture is subquadrate; outer lip slightly expanded and reflected.

The specimen described and figured (U.S.N.M. no. 313582) is one of a series collected by Pedro de Mesa at Aparico, Golo Island. It has

5.8 whorls and measures: Length, 37.5 mm; greater diameter, 25 mm; lesser diameter, 22.8 mm.

The rest of the specimens (U.S.N.M. no. 313582) furnish the following data:

Number of whorls	Length	Greater diameter	Lesser diameter
	<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
5.5-----	35.0	26.0	23.0
5.3-----	36.6	26.0	23.1
5.5-----	30.5	24.1	21.2
5.8-----	33.2	25.0	21.5
5.6-----	36.5	27.3	23.2
5.5-----	40.0	24.1	21.7
5.5-----	34.2	24.5	22.2
5.4-----	37.1	26.9	24.1
5.3-----	34.5	26.6	23.0
5.0-----	30.2	24.8	21.6
5.1-----	31.8	24.5	21.7
5.4-----	33.0	24.5	22.0
5.4-----	33.6	24.6	22.6
5.1-----	30.9	23.9	21.7
5.4 ¹ -----	¹ 34.08	¹ 25.2	¹ 22.33
5.8 ² -----	² 40.0	² 27.3	² 24.1
5.0 ³ -----	³ 30.2	³ 23.9	³ 21.2

¹ Average.

² Greatest.

³ Least.

This subspecies is easily distinguished from the others by its brown suffusion on the last turn, in which respect it recalls *Cochlostyla* (*Hypselostyla*) *cinniformis ultima*, which also comes from Golo Island but probably from another locality. The dark-brown bands in this race will easily distinguish it from the bright reddish-brown band of *C. (H.) cinniformis ultima*.

COCHLOSTYLA (HYPSELOSTYLA) CINNIFORMIS MENAGEI Bartsch

PLATE 101, FIGURE 1

1932. *Cochlostyla* (*Hypselostylus*) *cinniformis menagei* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 338.

Shell broadly ovate. Nucleus and the early postnuclear whorls milky white. Beginning with the second postnuclear whorl, the brown band at the summit makes its appearance, first as a light faint brown line gradually increasing in width and intensity. What is said of the line at the summit also holds good at the peripheral zone, which shows partly above the suture. There is a broad dark umbilical area corresponding in intensity of coloration with the peripheral band and the band at the summit on the last turn. The spaces between these zones are milk-white, and so is the inside of the aperture and the outer lip and the columella except where the dark bands show through. The periostracum where present is pale straw color, and in the case of

the dark zones the periostracum extends across the dark zones in perfect specimens as slender light threads. Nuclear whorls almost 2, well rounded, marked only by lines of growth. The postnuclear whorls are moderately well rounded, appressed at the summit, and marked by decidedly retractively slanting growth lines and closely spaced microscopic spiral striations, which are present on both spire and base. The periphery is almost rounded, the obsolete angle being scarcely perceptible. Base moderately long, somewhat inflated and strongly rounded. The aperture is subquadrate, oblique, and the outer lip slightly expanded and reflected. The columella is very narrow and bears a slight fold near its anterior limit.

The type (U.S.N.M. no. 313578) was collected on the Menage Expedition to Mindoro, and since this expedition worked only in northeastern Mindoro and on the slopes of Mount Halcon, it is presumed that the specimens were obtained somewhere in that region. The type has 5.5 whorls and measures: Length, 36.8 mm; greater diameter, 26.3 mm; lesser diameter, 23 mm.

A large series of additional specimens from the same source, most of which unfortunately are young, are before me. The adult shells yield the following data:

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
313578-----	5. 2	35. 8	26. 5	23. 3
313580-----	5. 5	34. 1	25. 0	22. 3
313580-----	5. 5	34. 3	24. 8	22. 5
313581-----	5. 2	36. 2	26. 7	24. 1
105259-----	5. 6	39. 9	26. 8	23. 7
Average-----	5. 4	36. 06	25. 96	23. 18
Greatest-----	5. 6	39. 9	26. 8	24. 1
Least-----	5. 2	34. 1	24. 8	22. 3

This subspecies is easily distinguished from the others by its much more vivid coloration, the light areas being much more intensely white and the dark areas equally intensely dark, but the dark areas are not so broad as in typical *Cochlostyla* (*Hypselostyla*) *cincinniformis*, and consequently the shell as a whole appears paler than in the typical race.

COCHLOSTYLA (HYPSELOSTYLA) CINCINNIFORMIS CINCINNIFORMIS (Sowerby)

PLATE 101, FIGURE 12

1841. *Helix cincinniformis* SOWERBY, Proc. Zool. Soc. London, 1841, pp. 17-18.

1842. *Achatina cincinniformis* PFEIFFER, Symbolae, vol. 2, p. 57.

1848. *Bulimus cincinniformis* PFEIFFER, Monographia heliceorum viventium, vol. 2, p. 9.

1850. *Amphidromus cincinniformis* ALBERS, Die Heliceen, ed. 1, p. 139.

1851. *Bulimus cincinniformis* REEVE, Conchologia iconica, pl. 6, fig. 28.
1851. *Bulimus cincinniformis* DESHAYES, Férussac's Histoire naturelle . . . mollusques . . ., vol. 1, pp. 45-46 (in part), pl. 157, figs. 3, 4.
1853. *Bulimus cincinniformis* PFEIFFER, Monographia heliceorum viventium, vol. 3, p. 300; in part.
1855. *Bulimus cincinniformis* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, ed. 2, vol. 1, Abt. 13, Theil 1, p. 181, pl. 53, figs. 6, 7.
1855. *Cochlostyla (Eudoxus) cincinniformis* H. and A. ADAMS, The genera of recent Mollusca, vol. 2, p. 144.
1856. *Amphidromus cincinnatiiformis* PFEIFFER, Malakozool. Blätter, vol. 2, p. 146.
1859. *Bulimus cincinniformis* PFEIFFER, Monographia heliceorum viventium, vol. 4, p. 361.
1860. *Cochlodryas cincinniformis* MARTENS, Albers, Die Heliceen, ed. 2, p. 176.
1868. *Bulimus cincinniformis* PFEIFFER, Monographia heliceorum viventium, vol. 5, p. 8.
1877. *Cochlostyla cinnina* SEMPER, Reisen im Archipel der Philippinen, pt. 2, vol. 3, p. 211; in part.
1877. *Bulimus cincinniformis* PFEIFFER, Monographia heliceorum viventium, vol. 8, p. 9; in part.
1887. *Cochlostyla cincinniformis* HIDALGO, Journ. Conchyl., vol. 35, p. 175.
1890. *Cochlostyla cincinniformis* PILSBRY, Man. Conch., ser. 2, vol. 6, pp. 18, 19, pl. 6, figs. 21-24.
1895. *Helicostyla cincinniformis* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 228.
1896. *Hypselostyla cincinnatiiformis* ELERA, Catalogo sistematico de toda la fauna de Filipinas, vol. 3, p. 599; in part.
1897. *Cochlostyla cincinniformis* HIDALGO, Journ. Conchyl., vol. 44, pp. 272, 331, 340, 347, 350.
1898. *Cochlostyla cincinniformis* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 133; in part.
1901. *Cochlostyla cincinnatiiformis* HIDALGO, Obras malacologicas, pp. 528-530, pl. 71, figs. 4-6.
1912. *Cochlostyla cincinnatiiformis* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 262-263 (in part), pl. 53, fig. 6.
1912. *Cochlostyla cincinnatiiformis unitaeniata* MÖLLENDORFF, KOBELT, and WINTER, *ibid.*, p. 263 (in part), pl. 53, figs. 7, 7a.
1912. *Cochlostyla cincinnatiiformis tritaeniata* MÖLLENDORFF, KOBELT, and WINTER, *ibid.*, p. 263 (in part), pl. 53, fig. 6.
1931. *Helicostyla cincinnatiiformis* CLENCH and ARCHER, Occ. Papers Boston Soc. Nat. Hist., vol. 5, p. 334, pl. 17, fig. 3.
1932. *Cochlostyla (Hypselostylus) cincinnatiiformis cincinnatiiformis* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 337.

Shell elongate-ovate. Periostracum where present pale straw-color. The nuclear whorls are dark, although the last one has the posterior half light. The postnuclear whorls are bluish white. They have a dark blackish-brown band at the summit and another at the periphery that usually shows about as far above the suture as the summit band is below it. The umbilical area also is of the same blackish-brown color. All these bands show within the aperture. The aperture, barring the brown bands, is bluish white, and so are the peristome and columella.

The specimen described and figured (U. S. N. M. no. 255790) is one of three I collected at Tilig, Lubang Island. It has 5.6 whorls and measures: Length, 42 mm; greater diameter, 26.5 mm; lesser diameter, 23.7 mm.

A series of additional specimens furnishes the following data:

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
255790-----	5. 9	39. 3	26. 4	23. 7
255790-----	5. 6	42. 2	26. 3	24. 0
255790-----	5. 8	40. 0	26. 0	23. 0
255291-----	5. 2	37. 1	27. 9	24. 6
313576-----	5. 1	33. 2	24. 4	22. 2
313576-----	5. 9	41. 0	27. 7	24. 6
313576-----	5. 8	38. 6	26. 2	23. 4
313576-----	5. 6	36. 9	25. 5	22. 9
313576-----	5. 7	39. 5	27. 8	24. 2
313576-----	5. 7	37. 0	25. 0	23. 0
313576-----	5. 1	33. 7	25. 8	22. 7
Average-----	5. 6	38. 0	26. 27	23. 5
Greatest-----	5. 9	42. 2	27. 9	24. 6
Least-----	5. 1	33. 2	24. 4	22. 2

I have selected this as typical *cincinniformis* because it satisfies most nearly the figure in Martini-Chemnitz, which is the oldest figure. This also depicts the dark nucleus.

Reeve's figure represents a much broader race having a light nucleus. I have specimens satisfying this but as yet no definite locality connected with them. It will probably prove to be a distinct race, requiring a name. *Cochlostyla* (*Hypselostyla*) *cincinniformis* *cincinniformis* can be distinguished from the other forms by the dark bands, exceedingly broad and almost black, and when specimens are perfect the dark bands are beautifully mottled by hydrophanous lines. In some of the specimens the nuclear turns and the first post-nuclear turns have a pinkish purplish tinge.

COCHLOSTYLA (HYPSELOSTYLA) CINCINNIFORMIS GUNTINGANA Bartsch

PLATE 101, FIGURE 3

1932. *Cochlostyla* (*Hypselostylus*) *cincinniformis* *guntingana* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 338.

Shell elongate-ovate. Nuclear whorls white and sometimes brown. Postnuclear whorls covered with a thin periostracum, which may be of pale straw-color or tinged with brownish orange and which crosses the dark bands in axial hydrophanous lines. The postnuclear whorls are marked by three dark chocolate-brown zones: One at the summit, one at the periphery, and the other surrounding the umbilical area, the

spaces between which may be straw-color or tinged with orange-brown. The interior of the aperture is bluish white, showing the external bands within. The peristome may be white or slightly tinged with brown. Nuclear whorls 2, well rounded, smooth except for incremental lines. Postnuclear whorls very slightly rounded and appressed at the summit, marked by feeble incremental lines and microscopic spiral striations on both spire and base. Periphery obsoletely angulated; base somewhat inflated, well rounded. Aperture subquadrate, oblique, outer lip slightly expanded and reflected. Columella rather slender, with a fold on its anterior third.

The type (U.S.N.M. no. 313574) was collected by me on the summit of Gunting Mountain, Loog Bay, Lubang Island. It has 5.3 whorls and measures: Length, 40 mm; greater diameter, 27.2 mm; lesser diameter, 24 mm.

A series of additional specimens yields the following measurements:

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
313574.....	5.3	40.4	26.7	24.4
255789.....	5.6	35.5	26.4	23.4
255789.....	5.1	37.2	29.3	25.8
255789.....	5.3	37.2	26.3	24.2
255789.....	5.5	36.5	27.0	23.8
255789.....	5.6	40.5	26.4	23.9
255789.....	5.5	36.4	26.3	24.5
255789.....	5.2	35.2	25.7	23.3
255789.....	5.6	39.0	27.0	24.7
255789.....	5.4	40.2	29.1	25.2
255789.....	5.8	40.1	27.7	24.7
195392.....	5.8	40.2	28.3	24.8
195392.....	6.0	41.6	28.6	26.1
195392.....	5.1	32.3	24.4	22.3
20388.....	6.0	40.8	26.6	24.2
Average.....	5.52	38.2	27.0	24.35
Greatest.....	6.0	41.6	29.3	26.1
Least.....	5.1	32.3	24.4	22.3

The yellow or orange-yellow coloration of the light areas in this shell will distinguish it from the rest. It is interesting to find both dark tips and light tips, and I am somewhat at a loss to account for this. I visited Gunting Mountain on two succeeding days but combined all my collections, and there is just the possibility that we may have here a lumping of material that in reality represents two races. The dark and light nuclei usually speak for phylogenetic stocks, and the problem resulting therefrom had not presented itself at the time of collecting. The field naturalist is all too prone to overlook important features of this kind until he has had laboratory experience.

COCHLOSTYLA (HYPSELOSTYLA) CINCINNIFORMIS CABRASSENSIS Bartsch

PLATE 101, FIGURE 10

1932. *Cochlostyla (Hypselostylus) cincinniformis cabrasensis* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 338.

Shell very regularly conic, of white ground color with a narrow brown band making a feeble beginning on the second postnuclear whorl and increasing in width and intensity of coloration after this. Another brown band immediately posterior to the periphery begins at a similar place and also increases in strength and coloration with the increasing whorls. There is likewise a broad basal brown area about the columellar region. This and the peripheral band on the last turn are dark chocolate-brown, while the ones at the summit are somewhat paler. These bands are crossed by fine hydrophanous axial lines on the last turn. The interior of the aperture is bluish white, showing conspicuously the bands within, the basal region being dark, rendering the outer lip dark to its edge at that portion of the shell, the columella being white and the outer lip soiled white. Nuclear whorls 2, well rounded, marked by incremental lines. Postnuclear whorls almost flattened, marked by rather strong, retractively slanting, incremental lines and microscopic, closely spaced, spiral striations, which are present on both spire and base. Periphery feebly angulated; aperture oblique, subquadrate; outer lip thin, slightly reflected. Columella narrow, slightly excavated.

The type (U.S.N.M. no. 313639), collected by Quadras on Cabra Island, has 5.6 whorls and measures: Length, 43.2 mm; greater diameter, 30 mm; lesser diameter, 25.8 mm.

This is distinguished from the other subspecies by having the brown bands much brighter and the light areas intensely bluish white.

COCHLOSTYLA (HYPSELOSTYLA) CINCINNIFORMIS LUBANENSIS (Clench and Archer)

PLATE 101, FIGURE 5

1841. *Helix cincinniformis* var. *a* SOWERBY, Proc. Zool. Soc. London, 1841, pp. 17-18.
 1851. *Bulimus cincinniformis* DESHAYES, Férussac's Histoire naturelle . . . mollusques . . ., vol. 1, pp. 45-46 (in part), pl. 151, figs. 5, 6.
 1912. *Cochlostyla cincinniformis* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 262-263 (in part), pl. 53, fig. 5.
 1931. *Helicostyla cincinniformis lubanensis* CLENCH and ARCHER, Occ. Papers Boston Soc. Nat. Hist., vol. 5, pp. 334-335, pl. 17, fig. 1.
 1932. *Cochlostyla (Hypselostylus) cincinniformis lubanensis* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 338.

Shell conic, covered by a pale straw-colored periostracum, which is usually worn off of the early whorl; when worn off of the later turns the

substratum or shell proper is white. There is a moderately broad, more or less interrupted band at the summit of the postnuclear whorls and another at the periphery. These two bands are pale brown, and they are both interrupted by axial hydrophanous spots. There is no dark columellar area in this race. The interior of the aperture, the outer lip, and columella are white. Nuclear whorls 2, well rounded, forming a blunt apex. The postnuclear whorls are appressed at the summit, moderately rounded, and marked by retractorily slanting lines of growth and fine, microscopic, closely spaced, spiral striations, which are present on both spire and base. The aperture is oblique, almost subquadrate; the outer lip is slightly expanded and reflected. The columella is slightly oblique, somewhat twisted, and slightly excavated.

A series of specimens before me yields the following measurements:

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
313585	5.8	37.0	26.0	23.5
313585	5.4	34.0	25.8	23.2
313585	5.5	35.0	25.9	22.7
313585	5.5	35.5	26.8	22.9
313585	5.9	41.1	27.2	24.7
313585	5.5	36.0	25.8	23.1
313585	5.9	41.6	27.2	24.6
313585	5.5	37.8	26.3	23.5
313585	5.5	34.8	24.7	23.2
313585	5.4	36.5	26.3	23.0
313585	5.9	39.3	26.7	24.1
313585	5.5	38.0	26.8	24.6
313585	5.8	41.3	27.0	23.8
313585	5.8	39.5	27.3	24.8
313585	5.5	37.7	24.7	22.5
313585	5.9	27.9	26.2	23.2
313585	5.1	34.8	25.5	22.8
313585	5.2	35.6	24.7	22.3
313585	5.4	39.1	25.9	23.7
313585	5.2	33.7	24.7	22.9
313585	5.5	35.9	25.8	23.2
313585	6.0	39.6	25.7	23.5
313585	5.9	39.8	27.6	24.9
313585	6.1	41.6	26.6	24.5
313585	5.2	35.2	25.8	23.6
313585	5.9	40.8	27.0	22.9
313585	6.0	39.7	25.7	22.4
313586	5.8	41.6	27.2	24.9
313586	5.5	36.0	21.3	22.4
313586	5.6	38.5	25.5	23.4
313586	5.8	41.3	29.5	26.1
313586	5.8	40.1	27.9	24.9
313586	5.8	37.9	26.2	23.4
313586	5.7	41.2	27.9	25.2
313586	5.2	33.8	23.7	21.7
313586	6.0	45.0	30.8	27.5
313586	5.9	40.4	26.0	23.7
313586	5.7	38.7	26.5	23.7
313586	5.2	34.2	25.4	22.6

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
313586-----	5. 7	38. 8	26. 4	24. 7
313586-----	5. 3	36. 5	26. 0	23. 3
313586-----	5. 6	39. 6	28. 2	24. 9
313586-----	5. 6	39. 1	29. 3	25. 5
313586-----	5. 6	37. 0	25. 0	23. 6
313586-----	5. 3	36. 0	25. 4	22. 3
195392-----	6. 0	44. 1	24. 1	27. 0
Average-----	5. 63	38. 0	26. 26	23. 8
Greatest-----	6. 1	45. 0	29. 5	27. 5
Least-----	5. 1	27. 9	21. 3	21. 7

Mr. de Mesa collected these specimens at Binacas, Lubang Island. Binacas is on the northwest coast of the island and about one-third of the distance from its northern end to the southern end, south of the northern end. Most of the other races so far known from this island have come from the east coast. It is remarkably uniform in shape and coloration. I take it that the albinos described by authors in the past have merely lost part of the hydrophanous color bands of the periostracum at the periphery and at the summit, a loss that would render them practically pure white. The absence of a dark umbilical area is a very characteristic feature of this race.

Subgenus EUDOXUS Albers

In this subgenus the shell is usually thin, ovate to ovate-conic, and covered by a very thin periostracum. The peristome varies from slightly to considerably expanded and reflected, and the columella is slightly excavated.

Type: *Cochlostyla* (*Eudorus*) *effusa* (Pfeiffer).

COCHLOSTYLA (EUDOXUS) JONASI (Pfeiffer)

PLATE 101, FIGURE 7

1846. *Helix jonasi* PFEIFFER, Proc. Zool. Soc. London, 1845, p. 126.
 1846. *Bulimus leai* PFEIFFER, Proc. Zool. Soc. London, 1846, p. 29.
 1848. *Helix jonasi* PFEIFFER, Monographia heliceorum viventium, vol. 1, p. 225.
 1848. *Bulimus leai* PFEIFFER, Monographia heliceorum viventium, vol. 2, p. 9.
 1849. *Bulimus leai* REEVE, Conchologia iconica, pl. 12, fig. 66.
 1850. *Helix jonasi* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, ed. 2, vol. 1, Abt. 12, Theil 1, p. 298, pl. 50, figs. 5, 6.
 1851. *Helix jonasi* REEVE, Conchologia iconica, pl. 26, fig. 113.
 1853. *Bulimus leai* PFEIFFER, Monographia heliceorum viventium, vol. 3, p. 300.
 1853. *Bulimus jonasi* PFEIFFER, *ibid.*, p. 172.
 1855. *Helicostyla jonasi* H. and A. ADAMS, The genera of recent Mollusca, vol. 2, p. 192.
 1856. *Bulimus leai* PFEIFFER, Malakozool. Blätter, vol. 2, p. 146.
 1859. *Bulimus leai* PFEIFFER, Monographia heliceorum viventium, vol. 4, p. 361.
 1859. *Helix jonasi* PFEIFFER, *ibid.*, p. 198.

1868. *Helix jonasi* PFEIFFER, Monographia heliceorum viventium, vol. 5, p. 267.
 1868. *Bulinus leai* PFEIFFER, Monographia heliceorum viventium, vol. 6, p. 8.
 1876. *Helix jonasi* PFEIFFER, Monographia heliceorum viventium, vol. 7, p. 578.
 1877. *Cochlostyla jonasi* SEMPER, Reisen im Archipel der Philippinen, pt. 2, vol. 3, p. 188.
 1877. *Cochlostyla leai* SEMPER, *ibid.*, pt. 2, vol. 3, p. 212.
 1887. *Cochlostyla leai* HIDALGO, Journ. Conchyl., vol. 35, p. 152.
 1887. *Cochlostyla jonasi* HIDALGO, *ibid.*, p. 189.
 1892. *Cochlostyla leai* PILSBRY, Man. Conch., ser. 2, vol. 8, p. 32, pl. 17, figs. 33, 34.
 1892. *Cochlostyla jonasi* PILSBRY, *ibid.*, pp. 32-33 (in part), pl. 17, figs. 32, 33; pl. 37, figs. 43, 44.
 1895. *Helicostyla leai* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 229.
 1895. *Helicostyla jonasi* PILSBRY, *ibid.*, p. 229.
 1896. *Cochlostyla leai* ELEKA, Catalogo sistematico de toda la fauna de Filipinas, vol. 3, p. 603.
 1896. *Cochlostyla jonasi* ELEKA, *ibid.*, p. 603; in part.
 1897. *Cochlostyla jonasi* HIDALGO, Journ. Conchyl., vol. 44, pp. 245, 257, 279, 290, 331, 332, 341, 347, 351.
 1897. *Cochlostyla leai* HIDALGO, *ibid.*, pp. 292 (in part), 329, 338, 349, 350.
 1898. *Cochlostyla jonasi* MÖLLENDORFF, Abh. Naturf. Ges. Götting, vol. 22, p. 131; in part.
 1911. *Cochlostyla jonasi* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pt. 1, pp. 251-252 (in part), pl. 51, figs. 8, 8a.
 1932. *Cochlostyla (Eudoxus) jonasi* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 338.

The shell is very broadly ovate, covered by a thin pale straw-colored periostracum. The early whorls are a little paler than the last. The interior of the aperture is bluish white, which is also the color of the peristome and columella. Nuclear whorls 2.1, strongly rounded and marked by rather coarse incremental lines and on the last half turn by fine spiral striations. The postnuclear whorls are somewhat inflated, well rounded, appressed at the summit, and marked by decidedly obliquely curved incremental lines, which on the appressed portion at the summit are very finely denticulated. In addition to this, the entire surface of the spire is marked by scarcely perceptible, closely spaced, microscopic, spiral striations. These I have been unable to observe on the base. Suture feebly constricted; periphery inflated, strongly rounded. Base short, strongly rounded with an impression at the insertion of the columella, which almost causes it to appear as if umbilicated. The aperture is subcircular; the outer lip is slightly expanded and reflected, while the columella is rather broad, somewhat excavated, terminating anteriorly in a denticle a little posterior to its junction with the outer lip. The columella is surrounded by a thin callus, which also extends over the parietal wall.

The specimen described and figured is one of two (U.S.N.M. no. 309459) that come from the Redfield collection, having probably

been obtained from Cuming. It has 5.4 whorls and measures: Length, 33.7 mm; greater diameter, 28 mm; lesser diameter, 23.6 mm. The other specimen has also 5.4 whorls and measures: Length, 31.2 mm; greater diameter, 26.4 mm; lesser diameter, 22.4 mm.

There are two additional specimens in our collection collected by Cuming (U.S.N.M. no. 105285). They have 5 and 5.4 whorls and measure, respectively: Length, 31.1 and 30.3 mm; greater diameter, 27.3 and 24.4 mm; lesser diameter, 23.2 and 21.6 mm.

None of the specimens in our collection have a specific locality.

COCHLOSTYLA (EUDOXUS) BUSCHI (Pfeiffer)

PLATE 101, FIGURE 9

1846. *Helix buschi* PFEIFFER, Proc. Zool. Soc. London, 1845, p. 126.
1848. *Helix buschi* PFEIFFER, Monographia heliceorum viventium, vol. 1, p. 226.
1849. *Bulimus albersi* PFEIFFER, Zeitschr. Malak., vol. 6, p. 86.
1850. *Helix buschi* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, ed. 2, vol. 1, Abt. 12, Theil 1, p. 300, pl. 44, figs. 7, 8.
1850. *Bulimus albersi* ALBERS, Die Heliceen, ed. 1, p. 136.
1853. *Bulimus albersi* PFEIFFER, Monographia heliceorum viventium, vol. 3, p. 300; in part.
1855. *Helicostyla buschi* H. and A. ADAMS, The genera of recent Mollusca, vol. 2, p. 191.
1856. *Bulimus albersi* PFEIFFER, Malakozool. Blätter, vol. 2, p. 142.
1859. *Bulimus albersi* PFEIFFER, Monographia heliceorum viventium, vol. 4, p. 362; in part.
1860. *Cochlodryas albersi* MARTENS, Albers, Die Heliceen, ed. 2, p. 176.
1868. *Bulimus albersi* PFEIFFER, Monographia heliceorum viventium, vol. 6, p. 8; in part.
1877. *Bulimus albersi* PFEIFFER, Monographia heliceorum viventium, vol. 8, p. 10; in part.
1887. *Cochlostyla buschi* HIDALGO, Journ. Conchyl., vol. 35, p. 152; in part.
1892. *Cochlostyla jonasi* PILSBRY, Man. Conch., ser. 2, vol. 7, pl. 37, figs. 43, 44.
1892. *Cochlostyla jonasi* PILSBRY, Man. Conch., ser. 2, vol. 8, pp. 32-33; in part.
1895. *Helicostyla jonasi* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 229; in part.
1896. *Eudoxus jonasi* ELERA, Catalogo sistematico de toda la fauna de Filipinas, vol. 3, p. 603; in part.
1897. *Cochlostyla buschi* HIDALGO, Journ. Conchyl., vol. 44, pp. 253, 257, 262, 266, 306, 329, 331, 332, 338, 347, 350.
1898. *Cochlostyla buschi* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 132; in part.
1901. *Cochlostyla buschi* HIDALGO, Obras malacologicas, pp. 483-485 (in part), pl. 87, fig. 5.
1911. *Cochlostyla (Phengus) jonasi* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, p. 256, pl. 52, figs. 8, 8a.
1932. *Cochlostyla (Eudoxus) buschi* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 338.

Shell elongate-ovate, covered with a pale lemon-yellow periostracum, which when removed leaves the shell a bluish white. The interior of aperture, peristome, and columella are bluish white. Nuclear whorls 2, well rounded, marked by incremental lines, and the last

half of the last turn by fine spiral striations. The postnuclear whorls are moderately rounded, appressed at the summit, and marked by very fine retractorily curved incremental lines and closely spaced microscopic spiral striations, which are present on both spire and base. The suture is moderately constricted; the periphery with an obsolete angle. The base is moderately long, somewhat inflated, and strongly rounded. The aperture is subcircular with the outer lip slightly expanded and reflected, and the columella is gently curved and rather narrow and without fold or tooth at the anterior end. The columellar wall and parietal wall are covered with a thin translucent callus.

The specimen described and figured (U.S.N.M. no. 309451) has 5.5 whorls and measures: Length, 34.6 mm; greater diameter, 24.2 mm; lesser diameter, 21.6 mm. It is from Mindoro, without specific locality.

Additional specimens yield the following data:

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
309451.....	5.4	31.0	23.5	21.1
309451.....	5.2	30.2	24.8	21.2
309471.....	5.4	29.0	23.2	20.4
309415.....	5.4	29.7	21.2	19.3
309495.....	5.5	35.0	24.0	21.9
309495.....	5.3	30.1	22.6	20.3
99896.....	5.5	31.9	23.3	21.0
99896.....	5.5	32.1	24.0	21.3
99896.....	5.2	30.2	23.2	21.0
109363.....	5.2	28.2	22.4	18.9
20396.....	5.5	34.1	25.8	22.3
20396.....	5.3	29.2	20.7	19.3
Average.....	5.37	30.9	23.22	20.67
Greatest.....	5.5	35.0	25.8	22.3
Least.....	5.2	28.2	20.7	18.9

This species recalls *Cochlostyla (Eudoxus) jonasi*, but that is much stouter and has the columella toothed or notched at the anterior end.

COCHLOSTYLA (EUDOXUS) SIMPLEX (Jonas)

PLATE 101, FIGURE 6

1843. *Bulimus simplex* JONAS, Proc. Zool. Soc. London, 1842, p. 189.
 1843. *Bulimus simplex* PHILIPPI, Abbildungen und Beschreibungen neuer oder wenig gekannter Conchylien, vol. 1, p. 53, pl. *Bulimus* 1, fig. 2.
 1848. *Bulimus simplex* PFEIFFER, Monographia heliceorum viventium, vol. 2, p. 11.
 1848. *Bulimus simplex* REEVE, Conchologia iconica, pl. 12, fig. 63.
 1850. *Eudoxus simplex* ALBERS, Die Heliceen, ed. 1, p. 137.
 1853. *Bulimus simplex* PFEIFFER, Monographia heliceorum viventium, vol. 3, p. 300.

1855. *Bulimus simplex* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, ed. 2, vol. 1, Abt. 13, Theil 1, pp. 181-182, pl. 53, figs. 8, 9.
1856. *Bulimus simplex* PFEIFFER, Malakozool. Blätter, vol. 2, p. 147.
1859. *Bulimus simplex* PFEIFFER, Monographia heliceorum viventium, vol. 4, p. 362.
1860. *Phengus simplex* MARTENS, Albers, Die Heliceen, ed. 2, p. 180.
1868. *Cochlostyla simplex* PFEIFFER, Monographia heliceorum viventium, vol. 6, p. 8.
1874. *Cochlostyla simplex* SEMPER, Reisen im Archipel der Philippinen, pt. 2, vol. 3, p. 218.
1877. *Bulimus simplex* PFEIFFER, Monographia heliceorum viventium, vol. 8, p. 10.
1887. *Cochlostyla simplex* HIDALGO, Journ. Conchyl., vol. 35, p. 177; in part.
1892. *Cochlostyla simplex* PILSBRY, Man. Conch., ser. 2, vol. 8, pp. 33-34, pl. 8, figs. 48, 49, 52.
1895. *Helicostyla simplex* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 229.
1897. *Cochlostyla simplex* HIDALGO, Journ. Conchyl., vol. 44, pp. 315, 331, 332, 341, 347, 348, 350, 352.
1898. *Cochlostyla simplex* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 131; in part.
1901. *Cochlostyla simplex* HIDALGO, Obras malacologicas, p. 523 (in part), pl. 73, fig. 2.
1911. *Cochlostyla simplex* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 252-254 (in part), pl. 51, figs. 1, 1a.
1932. *Cochlostyla (Eudoxus) simplex* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 338.

Shell small, ovate, the early whorls white, the last one with a grayish-olive tinge, more intense on the base. Interior of the aperture, peristome, and columella white. The periostracum is exceedingly thin. Nuclear whorls 1.6, strongly rounded, smooth, forming an almost pointed apex, marked by lines of growth only. The post-nuclear whorls are strongly rounded, the last one decidedly inflated, appressed at the summit, and marked by rather rough threadlike lines of growth and numerous microscopic, closely spaced, spiral striations, which are present on both spire and base. Suture moderately constricted; periphery obsoletely angulated, at least the more intense coloration of the base and the sharp termination thereof at the periphery give one the impression of an obsolete angle. Aperture broadly ovate, slightly oblique; outer lip thin, expanded, and reflected. The columella is narrow, with a faint thread a little posterior at the junction of the columella with the outer lip.

There are three specimens from the Redfield collection (U.S.N.M. no. 309465) collected on Mindoro, one of which I have described and figured; one specimen (U.S.N.M. no. 313602) collected by Quadras; four specimens (U.S.N.M. no. 20389) collected by the Exploring Expedition, probably at the southern tip of Mindoro. These yield the following data:

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
309465.....	5. 3	<i>Mm</i> 27. 5	<i>Mm</i> 19. 0	<i>Mm</i> 17. 5
309465.....	5. 5	28. 3	19. 7	17. 8
309465.....	5. 4	28. 0	18. 9	17. 5
313602.....	5. 4	27. 9	19. 1	17. 5
20389.....	5. 5	30. 2	20. 3	18. 0
20389.....	5. 6	28. 5	18. 6	17. 4
20389.....	5. 1	26. 2	19. 4	17. 4
20389.....	5. 2	24. 8	17. 8	15. 7
Average.....	5. 37	27. 6	19. 0	17. 3
Greatest.....	5. 6	30. 2	20. 3	18. 0
Least.....	5. 1	24. 8	17. 8	15. 7

This subspecies is nearest related to shells that have been listed under the same name from the Island of Romblon. The Romblon shell, however, is in every way larger, heavier, and with more intense green coloration and should be differentiated from the Mindoro specimens. The huge series of these before me collected on the Menage Expedition easily shows the need for its separation. I therefore give to it the name *Cochlostyla (Eudoxus) steerei*.

COCHLOSTYLA (EUDOXUS) ALBINA (Grateloup)

PLATE 101, FIGURE 4

1840. *Bulimus albinus* GRATELOUP, Actes Soc. Linn. Bordeaux, vol. 11, pp. 166, 417, pl. 3, fig. 24.
1841. *Bulimus bullula* BRODERIP, Proc. Zool. Soc. London, 1840, p. 159.
1842. *Bulimus bullula* PFEIFFER, Symbolae, vol. 2, p. 44.
1843. *Bulimus bullula* PHILIPPI, Abbildungen und Beschreibungen neuer oder wenig gekannter Conchylien, p. 53, pl. *Bulimus* 1, fig. 1.
1848. *Bulimus bullula* PFEIFFER, Monographia heliceorum viventium, vol. 2, p. 10; in part.
1850. *Eudoxus bullula* ALBERS, Die Heliceen, ed. 1, p. 137.
1851. *Bulimus bullula* REEVE, Conchologia iconica, pl. 12, fig. 68.
1853. *Bulimus bullula* PFEIFFER, Monographia heliceorum viventium, vol. 3, p. 398.
1856. *Bulimus (Eudoxus) bullula* PFEIFFER, Malakozool. Blätter, vol. 2, p. 146.
1868. *Bulimus bullula* PFEIFFER, Monographia heliceorum viventium, vol. 5, p. 7.
1872. *Cochlostyla bullula* MARTENS, Malakozool. Blätter, vol. 20, p. 180.
1877. *Cochlostyla bullula* SEMPER, Reisen im Archipel der Philippinen, pt. 2, vol. 3, p. 218; in part.
1877. *Bulimus bullula* PFEIFFER, Monographia heliceorum viventium, vol. 8, p. 8; in part.
1887. *Cochlostyla bullula* HIDALGO, Journ. Conchyl., vol. 35, pp. 156-157.
1890. *Cochlostyla virginea* PILSBRY, Man. Conch., ser. 2, vol. 6, pp. 36-37 (in part), pl. 7, figs. 31-34.
1895. *Helicostyla virginea* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 229.
1896. *Helicostyla virginea* ELERA, Catalogo sistematico de toda la fauna de Filipinas, vol. 3, pp. 604-605; in part.
1897. *Cochlostyla albina* HIDALGO, Journ. Conchyl., vol. 44, pp. 247, 262.

1898. *Helicostyla virginea* Mollendorff, Abh. Naturf. Ges. Götting., vol. 22, p. 132; in part.
 1901. *Cochlostyla virginea* Hidalgo, Obras malacológicas, pp. 486-487; in part.
 1912. *Helicostyla virginea* Mollendorff, Kobelt and Wytten, Sumpfer's Reisen im Archipel der Philippinen, vol. 10, p. 257; in part.
 1932. *Cochlostyla (Eulimna) albina* Bartsch, Journ. Washington Acad. Sci., vol. 22, p. 338.
 1933. *Helicostyla (Eulimna) virginea* Crench and Archer, Papers Michigan Acad. Sci., Arts, Letters, vol. 17, p. 544; in part.

Shell regularly ovate, thin, bluish white, with a pale bluish-green tinge on the base. There is a slender white line immediately at the summit of the shell, marking the appressed portion of the summit. Nuclear whorls 2, strongly rounded, smooth, forming a conical apex, marked by incremental lines and on the last half by fine spiral striations. The postnuclear whorls are rather high between the summit and suture and moderately well curved and marked by feeble lines of growth and microscopic spiral striations, which are present on both spire and base, although they are scarcely perceptible on the base. Suture slightly constricted; periphery of the last whorl inflated and well rounded. The base is rather long, somewhat inflated, evenly rounded. Aperture oval, oblique; the outer lip scarcely at all expanded or reflected. There is the merest trace of a curl shown. The inner lip or columella is also exceedingly narrow and threadlike, passing without interruption in an even curve into the basal lip. The columellar area and parietal wall are covered by a thin whitish callus.

The specimen described and figured (U.S.N.M. no. 255828), collected by Col. Edgar A. Mearns on the Mount Halcón Expedition in Mindoro, has 4.5 whorls and measures: Length, 34.3 mm; greater diameter, 24.2 mm; less diameter, 20.6 mm.

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		Mm	Mm	Mm
106404-----	5.0	32.4	21.7	19.8
106404-----	4.8	29.8	21.8	19.0
106404-----	4.6	33.2	22.7	20.1
106404-----	4.6	32.2	22.6	19.8
106404-----	4.6	31.8	21.8	19.4
106404-----	4.6	32.0	22.8	19.7
106404-----	4.6	32.0	22.4	20.0
106404-----	4.8	33.7	22.7	20.0
195398-----	4.8	35.5	24.5	21.6
195398-----	5.1	34.0	23.8	20.7
195398-----	5.1	35.8	24.0	21.2
195398-----	5.0	33.0	22.0	19.3
195398-----	5.0	34.8	22.4	20.0
309446-----	5.1	35.8	24.8	21.4
309446-----	4.9	31.8	22.6	20.0
313642-----	5.0	35.9	23.7	21.0
313642-----	5.4	35.8	22.0	19.6
313642-----	4.8	32.7	22.3	19.8

The United States National Museum collection contains the following specimens of this species: Eight (U.S.N.M. no. 106404), two of which were collected by Cuming; five (U.S.N.M. no. 195398) from the von Möllendorff collection from Mindoro; two (U.S.N.M. no. 309446) collected by Schmacker in Mindoro; three (U.S.N.M. no. 313642) collected by Juan Antonio in Mindoro. These yield the measurements given in the foregoing table.

This species is readily distinguishable from *Cochlostyla (Eudoxus) simplex* by its much larger size, more ovate shape, and much more oval aperture.

COCHLOSTYLA (EUDOXUS) CANONIZADOI Bartsch

PLATE 101, FIGURE 8

1932. *Cochlostyla (Eudoxus) canonizadoi* BAERTSCH, Journ. Washington Acad. Sci., vol. 22, p. 338.

Shell helicoid, rather elevated with a broadly conic spire. The spire is milk white. Base with a pale greenish tinge. Interior of aperture and peristome white. Nuclear whorls 1.5, marked by incremental lines, which are a little stronger on the last portion of the last turn than on the rest. Postnuclear whorls inflated, well rounded, appressed at the summit, and marked by incremental lines and feebly incised spiral striations. Suture moderately impressed. Periphery of the last whorl inflated, feebly angulated. The base is short, inflated, and strongly rounded. Aperture very broadly ovate, almost subcircular. The peristome is broadly expanded and reflected. The inner lip is expanded and reflected and is adnate to the base except at the extreme tip. The parietal wall is glazed with a moderately thick callus.

U.S.N.M. no. 313723 contains 16 topotypes, which measure:

Number of whorls	Length	Greater diameter	Lesser diameter
	<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
5.0.....	28.9	27.5	24.1
5.0.....	26.1	28.6	24.8
5.0.....	26.5	25.3	22.7
5.0.....	25.3	26.8	22.0
5.0.....	25.1	25.9	22.1
4.9.....	22.8	23.8	20.0
5.0.....	25.8	27.4	22.5
5.0.....	22.6	23.8	20.4
4.7.....	22.8	26.0	21.4
4.8.....	22.7	23.2	20.0
5.1.....	29.1	28.8	25.7
4.9.....	26.2	24.7	21.7
5.0.....	25.0	26.9	23.1
4.9.....	24.9	25.8	21.6
4.6.....	22.3	23.3	21.7
4.7.....	22.7	24.1	20.7

The type (U.S.N.M. no. 313722), collected on Sibolon Island by Mr. Canonizado, has 5 whorls and measures: Length, 27.3 mm; greater diameter, 27.9 mm; lesser diameter, 22.5 mm.

This species strongly suggests *Cochlostyla* (*Cochlodryas*) *halichlora* Semper, from Luzon, but is in every way much smaller.

Subgenus PROCHILUS Albers

In this subgenus the shell is of small to medium size, of ovate, elongate-ovate, or ovate-conic form, and covered with a thin shining periostracum, which may or may not be hydrophanous. The base is usually narrowly perforated, although often the perforation is covered by the reflection of the inner lip. The peristome is broadly expanded, thickened, and reflected.

Type: *Cochlostyla* (*Prochilus*) *virgata* (Jay).

THE COCHLOSTYLA (PROCHILUS) VIRGATA (JAY) COMPLEX

Here and there, the world over, the field naturalist meets with problems of a most puzzling character. While in most instances he finds that organisms belonging to what we call a species reproduce themselves with their definite characters so faithfully that they are as easily recognized as the coins of a modern realm, nevertheless he now and then meets with an assemblage of specimens that occupy a definite habitat but, while they have certain characters in common that have caused naturalists to assign them as a species to a particular genus, present such an enormous range of variations that it is difficult to find two individuals exactly alike. Not infrequently he even finds individuals among such a group that might be assigned to a widely different species, if general resemblance only were considered.

Long ago groups of this kind were said to be in a state of flux, and more recently they have been said to be mutating, and the individual variants have been called mutants. Speculations as to the origin of these mutants have been many, and the literature of today is still filled with diverse concepts of this problem.

Personally, I believe that my *Cerion* breeding experiments have shed considerable light on the molluscan phase of mutants. Crossing *Cerion viaregis* Bartsch with *Cerion incanum* Binney produced in the F¹ generation offspring that fused in shell characters the features of the two parents, while the F² generation produced an endless array of mutants, varying enormously in size, color, sculpture, the structure of the soft anatomy, in fact, simply running riot as far as variation is concerned. Here then we have an explanation of a source of mutation.

What I have said regarding the *Cerion viaregis* and *Cerion incanum* hybridization experiments is duplicated in the field on the north coast of Cuba between Habana and Matanzas, where at the west end of a

certain stretch of coast line *Cerion tridentata* Pilsbry and Vanatta occurs and at the east end for a mile or more *Cerion peracuta* Torre. Here the same story of mutation applies, and I know a number of additional mutating colonies of Cerions in the Bahamas and Cuba. It is also true of *Vivipara* in Lake Lanao, Mindanao, Philippine Islands, and of at least four species of marine mollusks of the family Pyramidellidae in United States waters, as well as of the mollusks here under discussion.

Cochlostyla (Prochilus) virgata (Jay), as our synonymy shows, has been rechristened many times, and it is not surprising that this should have been the case. Isolated specimens reaching museum men unaware of the mutating condition of this complex would, on account of the great difference they displayed when compared with allied described species, be subjected to naming. It is only when a mass of material, such as lies before me, has been assembled or when in the field one finds that these mutants are produced in a single laying of a parent that their true inwardness becomes revealed. There is now no more excuse for holding them distinct species than there would be justification to give specific rank to all the horticultural varieties of chrysanthemums and dahlias displayed annually in our flower exhibits.

What the progenitors of *Cochlostyla (Prochilus) virgata* (Jay) may have been is a vital question, but opinions expressed at the present must be looked upon as mere conjectures. The recurrence of certain elements suggests an affinity with *Cochlostyla (Prochilus) cuyuensis* (Pfeiffer), whose races are found on the islands to the south and south-east of Mindoro. Certain other features, such as hydrophanous fulgurations of the periostracum, as well as the general coloration, suggest some members of the *Cochlostyla (Chrysallis) aspersa mindoroensis* (Broderip) complex, while still others suggest the small, plain yellow, thick-shelled *Cochlostyla (Prochilus) cerina* Bartsch, which appears to be common in southeastern Mindoro. It is possible that this has contributed the yellow element in our mutating complex.

An examination of the soft anatomy of these creatures, which I hope shortly to be able to make through the kindness of Mr. de Mesa, may throw additional light upon our problem.

COCHLOSTYLA (PROCHILUS) VIRGATA (Jay)

PLATES 102-105

1839. *Bulimus virgatus* JAY, Catalogue of recent shells in the cabinet of John C. Jay, p. 120, pl. 6, fig. 4.
1839. *Bulimus porraceus* JAY, *ibid.*, p. 120, pl. 6, fig. 5.
1840. *Bulimus labrella* GRATELOUP, Actes Soc. Linn. Bordeaux, vol. 11, p. 165.
1840. *Partula labrella* GRATELOUP, *ibid.*, pp. 423-424, pl. 4, fig. 6.
1841. *Bulinus dryas* BRODERIP, Proc. Zool. Soc. London, 1840, pp. 94-95.
1841. *Bulinus sylvanus* BRODERIP, *ibid.*, p. 95.
1842. *Bulinus virgatus* SOWERBY, The conchological illustrations, p. 8, p. 186, figs. 112-114.

1842. *Bulimus virgatus* PFEIFFER, Symbolae, vol. 2, p. 125.
1842. *Bulimus dryas* PFEIFFER, *ibid.*, p. 44.
1842. *Bulimus sylvanus* PFEIFFER, *ibid.*, p. 51.
1843. *Bulimus calobaptus* JONAS, Proc. Zool. Soc. London, 1842, p. 188.
1843. *Bulimus calobapta* PHILIPPI, Abbildungen und Beschreibungen neuer oder wenig gekannter Conchylien, p. 54, pl. 1, fig. 6.
1848. *Bulimus virgatus* PFEIFFER, Monographia heliceorum viventium, vol. 2, pp. 40-41; in part.
1848. *Bulimus dryas* PFEIFFER, *ibid.*, pp. 41-42; in part.
1848. *Bulimus calobapta* PFEIFFER, *ibid.*, p. 42.
1850. *Amphidromus calobapta* ALBERS, Die Heliceen, ed. 1, p. 139.
1850. *Amphidromus virgatus* ALBERS, *ibid.*, p. 139.
1850. *Bulimus dryas* ALBERS, *ibid.*, p. 140.
1851. *Bulimus cuyoensis* REEVE, Conchologia iconica, pl. 9, figs. 43a, 43b; list in part, not the figures.
1851. *Bulimus dryas* REEVE, *ibid.*, pl. 9, figs. 45a-c.
1851. *Bulimus virgatus* REEVE, *ibid.*, pl. 9, figs. 46a-c.
1851. *Bulimus dryas* DESHAYES, Férussac's Histoire naturelle . . . mollusques . . ., vol. 2, pt. 2, p. 61, pl. 111, figs. 3-7.
1851. *Bulimus calobaptus* DESHAYES, *ibid.*, pp. 57-58; in part.
1851. *Bulimus virgatus* DESHAYES, *ibid.*, pp. 62-63, pl. 111, figs. 3-7.
1853. *Bulimus virgatus* PFEIFFER, Monographia heliceorum viventium, vol. 3, p. 40; in part.
1853. *Bulimus dryas* PFEIFFER, *ibid.*, p. 323.
1853. *Bulimus calobaptus* PFEIFFER, *ibid.*, p. 326; in part.
1855. *Bulimus calobapta* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, ed. 2, vol. 1, Abt. 13, Theil 1, p. 116, pl. 35, figs. 11-14.
1856. *Bulimus* (*Amphidromus*) *dryas* PFEIFFER, Malakozool. Blätter, vol. 2, p. 147.
1856. *Bulimus* (*Amphidromus*) *virgatus* PFEIFFER, *ibid.*, p. 147.
1856. *Amphidromus calobaptus* PFEIFFER, *ibid.*, p. 147.
1859. *Bulimus virgatus* PFEIFFER, Monographia heliceorum viventium, vol. 4, p. 382; in part.
1859. *Bulimus dryas* PFEIFFER, *ibid.*, p. 382.
1859. *Bulimus calobaptus* PFEIFFER, *ibid.*, p. 384; in part.
1860. *Prochilus calobaptus* MARTENS, Albers, Die Heliceen, ed. 2, p. 179.
1860. *Prochilus virgata* MARTENS, *ibid.*, p. 179.
1860. *Prochilus dryas* MARTENS, *ibid.*, p. 179.
1868. *Prochilus virgatus* PFEIFFER, Monographia heliceorum viventium, vol. 6, p. 28; in part.
1868. *Bulimus dryas* PFEIFFER, *ibid.*, p. 28.
1868. *Bulimus calobaptus* PFEIFFER, *ibid.*, p. 29; in part.
1877. *Cochlostyla virgata* SEMPER, Reisen im Archipel der Philippinen, pt. 2, vol. 3, p. 221.
1877. *Cochlostyla dryas* SEMPER, *ibid.*, p. 221.
1877. *Cochlostyla calobapta* SEMPER, *ibid.*, p. 221.
1877. *Cochlostyla sylvanoides* SEMPER, *ibid.*, p. 222, pl. 10, fig. 4.
1877. *Bulimus dryas* PFEIFFER, Monographia heliceorum viventium, vol. 8, p. 42.
1877. *Bulimus calobaptus* PFEIFFER, *ibid.*, p. 46; in part.
1877. *Bulimus virgatus* PFEIFFER, *ibid.*, p. 42; in part.
1887. *Cochlostyla calobapta* HIDALGO, Journ. Conchyl., vol. 35, pp. 174-175; in part.
1887. *Cochlostyla virgata* HIDALGO, *ibid.*, p. 181.

1892. *Cochlostyla calobapta* PILSBRY, Man. Conch., ser. 2, vol. 8, pp. 46-47 (in part), pl. 15, fig. 7.
1892. *Cochlostyla virgata sylvanoides* PILSBRY, *ibid.*, pp. 48-49, pl. 16, fig. 11; pl. 17, fig. 37.
1892. *Cochlostyla dryas* PILSBRY, *ibid.*, p. 49, pl. 16, figs. 18, 19, 25.
1892. *Cochlostyla virgata porracea* PILSBRY, *ibid.*, p. 48, pl. 17, fig. 36.
1892. *Cochlostyla virgata* PILSBRY, *ibid.*, pp. 48-49, pl. 16, figs. 11-15; pl. 17, fig. 35.
1892. *Cochlostyla virgata pulchrior* PILSBRY, *ibid.*, p. 49, pl. 16, figs. 12, 13.
1895. *Helicostyla calobapta* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 231; in part.
1895. *Helicostyla porracea* PILSBRY, *ibid.*, p. 231.
1895. *Helicostyla virgata* PILSBRY, *ibid.*, p. 231.
1895. *Helicostyla sylvanoides* PILSBRY, *ibid.*, p. 231.
1895. *Helicostyla dryas* PILSBRY, *ibid.*, p. 231.
1895. *Helicostyla virgata pulchrior* PILSBRY, *ibid.*, p. 231.
1896. *Prochilus calobapta* ELERA, Catalogo sistematico de toda la fauna de Filipinas, vol. 3, p. 609; in part.
1896. *Cochlostyla virgata* ELERA, *ibid.*, pp. 609-610.
1896. *Cochlostyla virgata porracea* ELERA, *ibid.*, p. 610.
1896. *Cochlostyla virgata pulchrior* ELERA, *ibid.*, p. 610; in part.
1896. *Cochlostyla dryas* ELERA, *ibid.*, p. 610.
1897. *Cochlostyla virgata* HIDALGO, Journ. Conchyl, vol. 44, pp. 246, 247, 248, 254, 256, 259, 291, 319, 324, 331, 341, 350.
1898. *Cochlostyla calobapta* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 144; in part.
1898. *Cochlostyla virgata* MÖLLENDORFF, *ibid.*, p. 145; in part.
1898. *Cochlostyla virgata alampe* MÖLLENDORFF, *ibid.*, p. 145; *nomen nudum*.
1898. *Helicostyla virgata sylvanoides* MÖLLENDORFF, *ibid.*, p. 145.
1898. *Cochlostyla dryas* MÖLLENDORFF, *ibid.*, p. 146; in part.
1901. *Cochlostyla porracea* HIDALGO, Obras malacologicas, pt. 1, p. 504 (in part); pp. 504-507, pl. 82, figs. 1-8; pl. 98, figs. 4-7; pl. 127, fig. 6.
1901. *Cochlostyla virgata* HIDALGO, *ibid.*, pp. 509-511 (in part), pl. 94, figs. 1-7.
1901. *Cochlostyla calobapta* HIDALGO, *ibid.*, pp. 512-513 (in part), pl. 127, fig. 5(?).
1914. *Cochlostyla (Prochilus) calobapta* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 322-324; in part.
1914. *Cochlostyla (Prochilus) virgata* MÖLLENDORFF, KOBELT, and WINTER, *ibid.*, pp. 322-324, pl. 72, figs. 3-14.
1914. *Helicostyla virgata sylvanoides* MÖLLENDORFF, KOBELT, and WINTER, *ibid.*, p. 329, pl. 74, figs. 1, 2.
1914. *Cochlostyla virgata alampe* MÖLLENDORFF, KOBELT, and WINTER, *ibid.*, p. 330.
1914. *Cochlostyla dryas* MÖLLENDORFF, KOBELT, and WINTER, *ibid.*, pp. 330-331, pl. 74, figs. 8-10.
1914. *Cochlostyla dryas porracea* MÖLLENDORFF, KOBELT, and WINTER, *ibid.*, p. 331, pl. 77, figs. 1-6.
1932. *Cochlostyla (Prochilus) virgata* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 338.
1932. *Helicostyla virgata maxwellsmithi* MCGINTY, Nautilus, vol. 46, p. 65, pl. 4, fig. 8.
1933. *Helicostyla (Prochilus) virgata* CLENCH and ARCHER, Papers Michigan Acad. Sci., Arts, Letters vol. 17, p. 543.
1933. *Helicostyla (Prochilus) virgata pulchrior* CLENCH and ARCHER, *ibid.*, p. 543.
1933. *Helicostyla (Prochilus) virgata porracea* CLENCH and ARCHER, *ibid.*, p. 543.

In *Cochlostyla* (*Prochilus*) *virgata* (Jay) the shell varies enormously in size and shape; it may be elongate-conic or elongate-ovate, slender or gibbose. The whorls may be slightly rounded or inflated. The suture ranges from poorly defined to strongly impressed. The periphery may show indications of an angulation or it may be inflated and well rounded. The base may be short and inflated and well rounded or produced and but slightly rounded. The aperture may vary from oval to subquadrate; the outer lip may be slightly expanded and reflected or broadly expanded and decidedly reflected and even thickened; the columella may be slender or broadly expanded at its insertion and reflected and appressed to the base without leaving an umbilical chink, or a slight umbilicus may be present. The parietal wall may be covered by a mere film of callus, or the callus may be so thickened as to join the posterior angle of the aperture with the columella. The nuclear whorls may be light or dark or intermediate. The postnuclear whorls are covered by a hydrophanous periostracum, which also presents great variation in coloration. It may be pale yellow or orange tinted or olivaceous or even brownish. The hydrophanous lines may be narrow, broad, or even fulgurated, vertical, protracted, or retracted. The shell itself, when the periostracum is removed, may be unicolor, bluish white, flesh colored, pale yellow, olivaceous, pale brown, dark brown, or purple-brown; varicial streaks may be present; or the shell may be variously banded with zones of brown and yellow, varying materially in width. The interior of the aperture is bluish white, sometimes more intensely bluish than at others. The peristome is usually of the same color, but in some of the forms it is edged with buff, brown, or purple. The nuclear whorls are well rounded and form a more or less pointed apex. They are smooth, except for lines of growth and the last portion of the last turn, which shows the beginning of fine spiral striations. The postnuclear whorls also show retractively slanting lines of growth, which in some individuals amount almost to threadlike riblets, and the strength of spiral striations on spire and base also shows considerable variation. There seems scarcely any limit to the degree of variation in the shape and color pattern, and some idea of the range of variation can be obtained by an examination of plates (unfortunately not in color).

On plate 102 I have copied 12 figures representing previously named shells that are now referred here. Figures 1, 5, and 9 represent *Bulinus sylvanus* Broderip as figured by Reeve in his *Conchologia Iconica* on plate 9, figures 46a, b, and c. Figures 1 and 2 represent Pilsbry's *Cochlostyla* (*Prochilus*) *pulchrior*, as figured on his plate 16, figures 12 and 13, figure 1 being a copy of one of the specimens of Reeve's *sylvanus*. Figure 3 is a copy of Jay's *Bulinus porraceus*, figured in Jay's *Catalogue*, plate 6, figure 5. Figure 4 is a copy of

Jay's *Bulimus virgatus*. Figure 6 is a copy of Grateloup's figure of *Partula labrella*, published in the *Actes de la Société Linnéenne de Bordeaux*, vol. 11, plate 4, figure 6. Figure 7 is a copy of Semper's *Cochlostyla sylvanoides*, published on plate 10, figure 4, of his *Reisen im Archipel der Philippinen*, pt. 2, vol. 3. Figure 8 is a copy of *calobaptus* Jonas as figured by Philippi in his *Abbildungen und Beschreibungen neuer oder wenig gekannter Conchylien*, on plate 1 of *Bulimus*, figure 6. Figures 10, 11, and 12 represent *Bulinus dryas* Broderip as figured by Reeve in his *Conchologia Iconica*, on plate 9, figures 45a-c. All these I consider belong here.

I give three additional plates to show range of variation:

In plate 103, the ground color consists of various shades of yellow. Figure 7 is unicolor without a dark umbilical blotch or spot. It, however, shows faint fulgurations on the early whorls. Figure 11 shows a very slender unicolor form with a heavy and broadly expanded lip. Figure 10 also is unicolor, but here we have a pale brown edging to the peristome. Figure 12 likewise is unicolor but differs markedly in shape. Figure 6 is unicolor but stands intermediate in shape between figure 12 and the usual form. Figure 4 is unicolor with the outer lip and columella broadly expanded and thickened. Figure 8 is unicolor, except for marked fulgurations, but has the umbilical dark area. Figure 9 is unicolor and more olivaceous than those preceding. It has a faint umbilical dark area and an indication of a peripheral zone. Figure 3 is markedly fulgurated with a peripheral brown band and an umbilical patch of brown. Figure 5 has a purplish-brown band at the summit and the peristome edged with the same color. There is also an umbilical dark area of the same or a little darker tint. Figure 2 has a dark band at the summit, a dark band at the periphery, a dark area at the umbilicus, and a dark edging to the entire peristome. Figure 1 has the early nuclear whorls light, succeeded by cloudy-brown whorls, which in turn are followed by an orange-yellow one, the last whorl having a light peripheral band.

All the shells pictured on plate 103 have light nuclear tips with the exception of figure 3, in which they are dark. To show how varied these shells are in the same locality, I need but draw attention to the fact that plate 103, figures 3 and 7, plate 104, figures 1, 2, 3, and 6, and plate 105, figures 2 and 8, come from Ariod, Calapan, while plate 103, figures 9 and 12, plate 104, figure 10, and plate 12, figure 4, come from Calapan.

In plate 104 the ground color ranges from orange-red to bright chestnut-brown. The nuclear whorls in figures 1, 5, 7, and 9 are white; in the rest they are dark. The periostracum is fulgurated in varying degrees with hydrophanous bands of varying widths and distribution. Here, as in plate 103, the interior of the aperture and peristome are bluish white. In figures 1, 2, 3, 8, 10, 11, and 12 the

peristome is edged with brown. Figure 4 has a very dark brown peripheral band and a dark brown columellar patch. In figure 6 a brown columellar patch is present, and the peripheral band is merely indicated. Figure 11 has both peripheral band and columellar patch, while in figure 12 they are merely indicated.

In plate 105 the ground color again varies from orange-red to brown. In this group the shells are all conspicuously spirally banded, the bands varying from narrow to broad and ranging from pale orange-brown to dark brown. The periostracum is again either plain or fulgurated. Figures 8, 9, 10, and 11 are light tipped; the rest are dark tipped. In figure 4 we have a reversal of the usual coloration, and the umbilical area is light instead of dark. In figure 1 there is a similar indication, although here the umbilical area is pale orange-yellow. Likewise in figures 2, 5, and 10. In figures 6, 7, 9, 11, and 12 the umbilical area is dark. The rest of the color phases are so well shown in our figures that there is no need of further explanation. I wish only to emphasize that in this mutating complex there is a remarkable range of variation.

COCHLOSTYLA (PROCHILUS) species?

PLATE 107, FIGURES 11-16

A scant collection of shells, suggesting *Cochlostyla* (*Prochilus*) *virgata* but with white or pale yellow periostracum, unicolor or banded with heavy and broadly reflected lip, is before me. They come from southern Mindoro, some from Bongabon, Bulalacao, and Mangarin, and some collected by the Exploring Expedition from Ilin Island.

When more specimens with definite locality labels come to hand we may have to resurrect *Cochlostyla* (*Prochilus*) *dryas* Broderip and consider it as a distinct species, probably with several zoogeographic races. Until then, however, the matter entails too many guesses to be so treated, and I prefer to pass it over for the time being. Attention should be called, however, to Broderip's statement in the Proceedings of the Zoological Society of London, 1841, page 95, that "Mr. Cuming informs us that the animal of this elegant shell * * * (*Cochlostyla* (*Prochilus*) *dryas*) was ash colored, darker above." On the same page he says of *Cochlostyla* (*Prochilus*) *sylvanus* that "Mr. Cuming informs us that the animal is reddish brown." *Cochlostyla* (*Prochilus*) *dryas* was reported by Broderip as coming from Mansalay, which would put it within the range of the present element.

The specimens shown on plate 106, figures 13 and 14, come from Bulalacao; figures 7, 11, and 12 from Mangarin.

COCHLOSTYLA (PROCHILUS) CERINA Bartsch

PLATE 107, FIGURE 9

1932. *Cochlostyla* (*Prochilus*) *cerina* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 338.

Shell of medium size, very elongate-ovate. Nuclear whorls pale buff. Postnuclear whorls yellow with an olivaceous tinge. Occasional varical streaks of darker shades are present. The coloration appears to be solely confined to the periostracum, for where this is removed the shell appears white below. There is a narrow light zone at the summit. Interior of aperture, expanded peristome, and columella bluish white. Nuclear whorls 2.5, forming a rather pointed spire. Postnuclear whorls slightly rounded, appressed at the summit, marked by retractorily slanting lines of growth and closely approximated microscopic spiral striations, which are present on both spire and base. The suture is very slightly impressed. The periphery is obsoletely angulated. The base is rather produced and moderately rounded. The aperture is auricular; the outer lip is broadly expanded and reflected, and the columella likewise is broadly expanded at its insertion and reflected over the base, leaving a narrow umbilical chink.

The type (U.S.N.M. 213672), collected by Quadras at Bulalacao, southeastern Mindoro, has 6.2 whorls and measures: Length, 45.8 mm; greater diameter, 22 mm; lesser diameter, 17.9 mm.

An additional series of specimens, some with localities and some without localities, but all from southeastern Mindoro, yields the following measurements:

U.S.N.M. no.	Number of whorls	Length	Greatest Diameter	Least Diameter
		<i>Mm.</i>	<i>Mm.</i>	<i>Mm.</i>
202122 ¹	7.0	45.9	20.6	17.7
202122 ¹	5.9	39.9	18.9	17.0
202122.....	6.2	41.0	19.5	17.4
202122.....	7.0	45.8	20.7	16.8
202122.....	6.1	41.6	20.6	17.1
202123.....	6.0	38.5	18.6	16.5
202123.....	6.0	38.5	19.4	17.6
202123.....	6.0	38.1	18.3	17.6
202123.....	6.8	44.5	21.0	18.6
202125.....	6.2	41.3	18.7	17.0
202125.....	6.0	37.8	19.1	16.9
202125.....	6.0	42.0	18.5	16.2
195041.....	6.0	37.0	18.5	16.7
195041.....	6.2	38.9	18.4	17.0
195041.....	6.0	37.4	19.1	17.0
195041.....	6.0	41.2	20.4	18.0
255905.....	6.3	39.0	18.4	16.4
255905.....	6.0	39.5	19.8	17.5
255905.....	6.5	43.7	19.4	17.0
255934.....	6.5	44.0	20.5	17.5
255934.....	6.2	40.7	19.8	17.5
29370.....	6.2	38.5	17.8	16.5
195419.....	6.0	37.7	18.8	17.9
195419.....	6.0	39.8	19.0	16.6
Average.....	6.2	40.5	19.4	17.1
Greatest.....	7.9	45.9	21.0	18.6
Least.....	5.9	37.0	17.8	16.2

¹Topotype.

The medium size and yellow color will distinguish this race from all the others. In one or two of the specimens there is a slight tendency toward a red-brown hair line at the summit of the whorls.

COCHLOSTYLA (PROCHILUS) PARTULOIDES (Broderip)

PLATE 106

1841. *Bulinus partuloides* BRODERIP, Proc. Zool. Soc. London, 1840, p. 181.
1841. *Bulimus partuloides* PFEIFFER, Symbolae, vol. 3, p. 49.
1842. *Bulimus partuloides* REEVE, Conchologia systematica . . . , vol. 2, pl. 11, figs. 54a, 54b.
1853. *Bulimus partuloides* PFEIFFER, Monographia heliceorum viventium, vol. 3, p. 323.
1856. *Bulimus (Amphidromus) partuloides* PFEIFFER, Malakozool. Blätter, vol. 2, p. 147.
1859. *Bulimus partuloides* PFEIFFER, Monographia heliceorum viventium, vol. 4, p. 382.
1860. *Prochilus partuloides* MARTENS, Albers, Die Heliceen, ed. 2, p. 179.
1861. *Bulimus pan* PFEIFFER, Proc. Zool. Soc. London, 1861, p. 23, pl. 3, fig. 5; not *Helix pan* Broderip, 1841.
1861. *Bulimus pan* PFEIFFER, Novitates conchologicae, p. 163, pl. 44, figs. 6, 7.
1868. *Bulimus partuloides* PFEIFFER, Monographia heliceorum viventium, vol. 6, p. 28.
1877. *Bulimus partuloides* PFEIFFER, Monographia heliceorum viventium, vol. 8, p. 42.
1877. *Cochlostyla nigrocincta* SEMPER, Reisen im Archipel der Philippinen, pt. 2, vol. 3, p. 221.
1877. *Cochlostyla partuloides* SEMPER, *ibid.*, p. 221.
1892. *Cochlostyla partuloides* PILSBRY, Man. Conch., ser. 2, vol. 8, p. 50, pl. 16, figs. 20-24.
1895. *Helicostyla (Prochilus) partuloides* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 231.
1896. *Prochilus partuloides* ELERA, Catalogo sistematico de toda la fauna de Filipinas, vol. 3, p. 611.
1897. *Cochlostyla partuloides* HIDALGO, Journ. Conchyl., vol. 44, pp. 258, 305, 309, 331, 332, 341, 350.
1898. *Cochlostyla partuloides* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 145.
1901. *Cochlostyla partuloides* HIDALGO, Obras malacologicas, p. 57.
1914. *Cochlostyla (Prochilus) partuloides* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 332-333, pl. 73, figs. 13, 14.
1932. *Cochlostyla (Prochilus) partuloides* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 338.

In this species, which also appears to be mutating, we have, as in *Cochlostyla (Prochilus) virgata* (Jay), a great variation in shape and coloration. Both of these features are shown on plate 106.

The shape of the shell varies from ovate to elongate-ovate. The shorter spire would be represented in what Pfeiffer called *pan*, and what Semper renamed *Cochlostyla nigrocincta*.

The nuclear whorls may be light or dark or any shade intermediate between them. There is here, as in *Cochlostyla (Prochilus) virgata*,

a narrow white zone at the summit. The coloration of the shell when the periostracum is removed may be white or it may have a band at the summit, one at the periphery, and a dark area at the umbilicus, or there may be additional spiral zones of various shades of brown or some of those indicated may be absent. The interior of the aperture, even in the dark specimens, and the expanded lip and columella are bluish white. The periostracum as a rule is pale olivaceous-yellow. Nuclear whorls about 2.3, forming a moderately pointed apex, smooth except for incremental lines and on the last portion of the last turn indications of fine spiral striations. The postnuclear whorls are slightly rounded, appressed at the summit, and marked by retractively slanting lines of growth and closely approximated spiral striations, which are present on both spire and base. The suture is slightly impressed, and the periphery is somewhat inflated and shows an indication of an obsolete angle. The shortness causes this to appear inflated and strongly rounded. The aperture is broadly oval, the peristome being very broadly expanded and reflected. That of the inner lip is curled over to form a narrow umbilicus. The parietal wall is covered with a thin callus.

This species occupies eastern Mindoro from Calapan to Bulalacao. Its small partuloid shape will differentiate it from all the other *Prochilus*.

Sixty-one perfect specimens before me yield the following measurements:

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
208124.....	5.8	32.2	16.9	15.2
208124.....	6.2	36.6	17.5	15.3
99844.....	5.3	32.2	17.3	15.5
99844.....	6.0	32.8	18.1	15.5
253704.....	6.0	31.6	17.0	14.3
253704.....	6.0	33.8	16.5	15.5
253704.....	6.0	33.6	16.4	15.2
20374.....	6.4	39.1	17.6	16.7
20372.....	6.1	33.6	16.9	15.9
20372.....	6.1	34.8	17.5	15.6
20372.....	6.0	32.8	17.5	15.4
20372.....	6.1	34.5	17.4	16.3
104367.....	5.9	32.6	16.8	15.5
104367.....	6.2	35.6	18.2	15.5
313673.....	6.0	35.2	17.9	16.7
313673.....	5.9	34.3	17.3	15.3
315859.....	5.9	35.3	18.1	16.3
104381.....	5.9	35.2	18.4	16.2
309421.....	6.2	35.7	19.8	16.1
130803.....	6.1	37.0	19.9	17.4
130803.....	5.9	34.6	17.5	15.9
313674.....	6.1	35.5	17.7	16.1
313674.....	6.2	37.4	18.6	16.4
313674.....	6.1	37.0	19.3	17.2
313674.....	5.9	35.9	18.0	16.1

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
313674-----	6.3	39.9	18.4	16.3
313674-----	6.3	37.9	17.9	16.0
313674-----	6.2	34.2	17.7	15.6
313674-----	6.2	36.7	17.7	16.2
313674-----	5.8	35.3	19.3	17.5
313674-----	6.0	36.3	19.3	17.0
313674-----	6.2	38.0	17.7	16.0
313674-----	5.9	36.7	18.9	16.0
313675-----	6.0	35.4	17.1	14.6
313675-----	6.0	35.6	17.6	15.7
313675-----	6.1	35.2	18.6	15.7
313675-----	6.0	35.0	17.8	15.7
313675-----	5.9	35.7	17.8	16.5
313675-----	5.9	34.4	18.3	15.7
313675-----	6.3	38.3	19.8	16.7
309413-----	6.2	39.6	19.4	16.0
195419-----	6.0	35.7	16.7	15.4
195419-----	6.1	35.5	18.4	16.4
208120-----	6.2	40.4	18.8	16.2
208120-----	6.1	37.3	19.0	16.5
208120-----	6.0	37.8	17.8	16.7
208120-----	6.1	37.3	18.9	16.8
208120-----	6.2	39.8	19.9	17.8
208120-----	6.0	34.7	17.7	16.7
208120-----	6.2	41.8	19.8	17.5
208120-----	6.1	35.4	17.8	16.4
208120-----	6.0	39.5	18.5	16.8
208120-----	6.2	43.3	20.6	18.0
208120-----	6.2	39.8	18.8	16.7
208120-----	6.2	39.7	19.8	17.3
208120-----	6.0	36.0	18.3	17.0
208120-----	6.0	36.2	19.4	16.2
208120-----	6.0	37.2	19.8	17.6
208120-----	6.0	34.5	17.5	15.4
309438-----	6.0	37.9	18.0	16.2
309438-----	6.1	38.9	19.1	16.7
Average-----	6.05	36.26	18.2	16.2
Greatest-----	6.4	43.3	20.6	18.0
Least-----	5.3	31.6	16.4	14.3

COCHLOSTYLA (PROCHILUS) CUYOENSIS (Pfeiffer)

The shell of this species varies much in size in the different races. In all of them, however, it is slender, elongate-conic, and thin, never ponderous. There is a great variation in color. The thin periostracum varies from pale straw-color through orange-brown to deep chocolate-brown and may be plain or marked by hydrophanous fulgurations. A narrow dark-brown band may be present at the summit, and another, usually a much more conspicuous one, may be present at the periphery, and a third dark area about the umbilicus may mark the shells or all these bands may be absent. In some there is even an additional band between the umbilical dark area and the periphery. The intensity of coloration of this brown band varies in the different races as does the width thereof. All sorts of the elements

mentioned are present in mutating groups. There are before me two shells from the Mindoro Province, both of which are smaller than any of the other subspecies belonging to this group. These two are here described.

There has been considerable confusion in what should constitute *Cochlostyla calobaptus* (Jonas), and the present species has by some been arranged as a subspecies of *calobaptus*. *Bulimus calobaptus* was originally described from Mindoro, and I am inclined to believe that it is one of the mutations of *Cochlostyla (Prochilus) virgata* (Jay); at least I seem to recognize in the figure published by Philippi in his *Abbildungen und Beschreibungen*, etc., volume 1, plate 1, *Bulimus* figure 6, a member of this complex. The next available specific name, therefore, for the group of shells that has been called *calobaptus* is *Cochlostyla (Prochilus) cuyoensis*, which I am here adopting. This species ranges over parts of Mindoro and the little islands about it and to the south of it and over the Busuanga group and southeastward to Tablas. In some places on some of the islands it seems to be perfectly stable, while on others it seems to be mutating. Here, as elsewhere, the mutations show a polyphyletic origin by having different colored nuclei, which would indicate hybridization.

KEY TO THE SUBSPECIES OF COCHLOSTYLA (PROCHILUS) CUYOENSIS IN MINDORO PROVINCE

Periphery with a dark-brown band.....	<i>contracta</i>
Periphery without a dark-brown band.....	<i>subpallida</i>

COCHLOSTYLA (PROCHILUS) CUYOENSIS CONTRACTA Möllendorff

PLATE 107, FIGURE 5

1898. *Cochlostyla calobapta contracta* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 144.
1914. *Cochlostyla calobapta contracta* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, p. 333, pl. 72, figs. 13-14.
1914. *Cochlostyla calobapta nana* MÖLLENDORFF, KOBELT, and WINTER, *ibid.*, p. 333.
1932. *Cochlostyla (Prochilus) cuyoensis contracta* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 338.

Shell very small. The nuclear whorls have a broad band immediately anterior to the suture, but it disappears on the postnuclear turns. There is also a broad conspicuous bright chestnut-brown band at the periphery and a broad area of the same color about the umbilicus. The periostracum is pale straw-color and marked by protractively slanting, more or less zigzag, broad hydrophanous bands. Interior of aperture, peristome, and columella white. Nuclear whorls 2, strongly rounded and forming a rather pointed apex. They are marked by incremental lines, which are somewhat crinkled at the summit. The postnuclear whorls are moderately rounded, appressed at the summit,

and marked by retractively curved lines of growth, which are almost threadlike and extend equally strong over spire and base. Aperture broadly oval; outer lip partly expanded and reflected; inner lip quite broad, reflected to form a narrow umbilicus.

The specimen described and figured (U.S.N.M. no. 313670) was collected by Quadras on Mindoro without definite locality. It has 5.3 whorls and measures: Length, 25.2 mm; greater diameter, 14.4 mm; lesser diameter, 12.9 mm.

This race is a miniature of the larger subspecies found on Tablas Island.

COCHLOSTYLA (PROCHILUS) CUYOENSIS SUBPALLIDA Bartsch

PLATE 107, FIGURE 8

1932. *Cochlostyla (Prochilus) cuyoensis subpallida* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 338.

Shell very small and thin, semitranslucent, of pale straw-color, marked by broad, retractively slanting, hydrophanous bands, which appear to terminate at the periphery. There is the faintest indication of a peripheral dark band and an ill-defined columellar area of the same shade. The nuclear whorls are white. The interior of the aperture, peristome, and columella are likewise white. Nuclear whorls 1.5, well rounded, smooth except for incremental lines, which render the summit slightly crenulated. The postnuclear whorls are moderately rounded, appressed at the summit, and marked by retractively slanting lines of growth, which are faintly threadlike. Suture moderately constricted. Periphery with the merest indication of an obsolete angle. Base moderately long, well rounded; aperture broadly oval; outer lip expanded and reflected; inner lip broadly expanded and reflected to form the narrow umbilicus. The parietal wall is covered by a straw-colored callus.

The type (U.S.N.M. no. 313671) was collected by C. Canonizado on Caluya Island. It has 5.3 whorls and measures: Length, 25.1 mm; greater diameter, 14.1 mm; lesser diameter, 12.5 mm.

This race differs from *Cochlostyla (Prochilus) cuyoensis contracta* in its exceedingly thin shell, which permits all the interior to be seen by transmitted light, and in lacking the decided color bands.

COCHLOSTYLA (PROCHILUS) FICTILIS (Broderip)

Shell small, spindle-shaped, covered with a thick periostracum, which is usually fulgurated with hydrophanous bands. In one of the subspecies, *Cochlostyla (Prochilus) fictilis mangarina*, there is a broad white band at the summit; in the others this is absent. The ground color varies considerably, but usually it is some shade of brown. The interior of the aperture is bluish white, and the peristome is of the same shade or tinged with pale yellow. Typical *Cochlostyla*

(*Prochilus*) *fictilis fictilis* (Broderip) and *Cochlostyla* (*Prochilus*) *fictilis larvata* (Broderip) come from Cuyo Island, which is one of the elements of the northern Calamian group.

The three subspecies that I am here describing come from the southwestern tip of Mindoro, southeastern part of Mindoro, and the Island of Ambulong immediately southwest of Ilin Island, also adjacent to Mindoro.

KEY TO THE SUBSPECIES OF COCHLOSTYLA (PROCHILUS) FICTILIS IN MINDORO PROVINCE

Shell yellow.....	<i>fulva</i>
Shell not yellow.	
Shell brownish.	
White band at summit very narrow.....	<i>ambulonensis</i>
White band at summit very broad.....	<i>cagurana</i>

COCHLOSTYLA (PROCHILUS) FICTILIS FULVA Bartsch

PLATE 107, FIGURES 6-7

1914. *Cochlostyla* (*Prochilus*) *larvata* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, p. 332 (in part), pl. 73, figs. 11, 12.
1932. *Cochlostyla* (*Prochilus*) *fictilis fulva* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 339.

Von Möllendorff, Kobelt, and Winter described and figured, under the name *Cochlostyla* (*Prochilus*) *larvata*, a shell in the following terms:

"Shell small, subperforate, subfusiform, pyramidal, quite solid, shining, nearly smooth, yellowish, subunicolor, or ornamented with pale oblique distant streaks. Spire pyramidal, turreted; apex somewhat obtuse. Whorls 6, nearly flattened, slightly increasing. Suture slightly impressed, the last whorl equaling two-fifths of the entire length of the shell, slightly descending anteriorly. Base attenuated. Aperture narrow, oblong, oval, compressed at the base, white within. Peristome thickened, white, with partly expanded margin. Parietal callus very thin, translucent but well defined externally; it does not render the peristome complete. The external margin of the peristome is broadly expanded, thickened, white, joining the columella with the posterior angle of the aperture." The measurements given by these authors are: Altitude 32.5 mm; diameter, 19 mm. Altitude of aperture with peristome, 14 mm; diameter, 10 mm.

They cited southeast Mindoro as the type locality and stated that the specimen figured is considerably smaller than the typical race, that it appears to be almost unicolor, except for a very small remnant of the basal columellar dark area, but that it has the characteristic, almost spindle, shape of the type.

I have not seen specimens of it and have given a free translation of the Latin diagnosis and a copy of their figure.

COCHLOSTYLA (PROCHILUS) FICTILIS AMBULONENSIS Bartsch

PLATE 107, FIGURE 3

1901. *Cochlostyla fictilis* BARRA, Catalogo sistematico de toda la fauna de Filipinas, vol. 3, p. 609; in part.
1914. *Cochlostyla fictilis* MOLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 334-335 (in part), pl. 73, figs. 15, 16.
1932. *Cochlostyla (Prochilus) fictilis ambulonensis* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 339.

Shell small, spindle-shaped, covered with a thin periostracum, which varies apparently in its color scheme, being in the hydrophanous areas pale straw-yellow. In the darker area it is either transparent or partakes of the dark portion of the subadjacent shell. Interior of aperture, the expanded outer lip, columella, and parietal callus white. Nuclear whorls 1.7, forming a slender apex, marked only by lines of growth. Postnuclear whorls rather high between the summit and suture, appressed at the summit, slightly rounded, and marked by refractively slanting lines of growth and rather strong and rather distantly spaced incised spiral lines, which are present on both spire and base. Suture moderately constricted. Periphery well rounded. Base produced, moderately rounded. Aperture very elongate-ovate. Outer lip broadly expanded, particularly basally, and reflected. The inner lip broadly expanded and reflected, forming the narrow umbilicus. Parietal wall covered by a thick callus, which, while translucent, nevertheless shows whitish.

The type (U.S.N.M. no. 313600), collected by Quadras on Ambulon Island, has 6.1 whorls and measures: Length, 36.7 mm; greater diameter, 14.9 mm.

U.S.N.M. no. 313601, from the same source, has 6.5 whorls and measures: Length, 39.7 mm; greater diameter, 16.4 mm.

Still another (U.S.N.M. no. 104349), from the Cuming collection, without definite locality, has 5.5 whorls and measures: Length, 38.8 mm; greater diameter, 16.2 mm.

COCHLOSTYLA (PROCHILUS) FICTILIS CAGURANA Bartsch

PLATE 107, FIGURE 2

1932. *Cochlostyla (Prochilus) fictilis cagurana* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 339.

Shell spindle-shaped. The early whorls white, gradually passing through pale buff and darker buff into brown, the last whorl being dark chestnut-brown except for a broad zone of white near the summit. The peristome, columella, and interior of aperture are white. In addition to this the shell is marked by broad axial zones of white. Nuclear whorls 2, rather high, forming a rather pointed apex. Postnuclear whorls high between the summit and suture, appressed at the

summit, slightly rounded, marked by retractively curved axial lines of growth and wavy, moderately deeply incised, rather distantly spaced spiral lines. Suture very slightly constricted; periphery strongly rounded. Base protracted, moderately rounded. Aperture broadly oval; outer lip very broadly expanded and reflected, thick. The inner lip also broadly expanded and very thick and reflected over the umbilical area, leaving only a narrow chink anteriorly. The parietal wall is covered by a thick whitish callus.

The type (U.S.N.M. no. 313598), collected by Pedro de Mesa at Mangarin or Cagurai, in southwestern Mindoro, has 6.4 whorls and measures: Length, 38.3 mm; greater diameter, 15.9 mm.

Three additional specimens (U.S.N.M. no. 313599), considerably smaller than the type, yield the following measurements:

Number of whorls	Length	Greater diameter	Lesser diameter
	<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
6.0-----	31.4	14.6	-----
5.6-----	30.0	14.7	-----
6.2-----	32.0	13.8	-----

This race is easily distinguished from the other Mindoro shells by its broad white band at the summit.

Subgenus *CHRYSTALLIS* Albers

In this subgenus the shell varies from ovate to ovate-conic to pupiform. Its base is slightly perforated. There is a great diversity in the thickness of the shell in the various species and races. The color varies from white through yellow, tawny to brown, and almost blackish brown, and the hydrophanous periostracum is equally variable, usually forming axial streaks or fulgurations of varying width and extent. The aperture may be white or dark within. The peristome varies also from white through buff through brown to iridescent bluish black.

The type is *Cochlostyla chrysalidiformis* (Sowerby).

COCHLOSTYLA (CHRYSTALLIS) CHRYSLIDIFORMIS (Sowerby)

Shell elongate-conic to pupiform, ranging in color from almost white through pale straw-color to lemon-yellow. Some races are unicolor, that is, almost white throughout, but even these show near the summit a series of hydrophanous marks corresponding more or less to hydrophanous axial bands. In shells that have a brown spiral zone immediately below the summit, the hydrophanous bands when present in the periostracum cause this brown band to be broken up into spots. The peristome may be white, yellowish, or brownish purple. Usually

the shells with the brown subsutural band have the dark-colored peristome. In the forms with the dark peristome the outer edge of the parietal callus is also tinted with the same shade. The postnuclear whorls are marked by irregular and irregularly developed, somewhat retractively slanting, rather closely spaced, obsolete riblets, which vary considerably in strength in the races here described. This species is confined to the island of Mindoro.

I am resurrecting *Cochlostyla ustulata* (Jay), as I have, in all the material that I have seen, not found any intergrade between this and *Cochlostyla chrysalidiformis*. Furthermore, the island of Mindoro has so many races of other things geographically separated that I feel certain that the forms of *Cochlostyla chrysalidiformis*, which I am here recognizing, will be found to have a geographic basis.

KEY TO THE SUBSPECIES OF COCHLOSTYLA (CHRYSTALLIS) CHRYSLIDIFORMIS

Summit of the whorls with a brown band.

Shell elongate-ovate.....*chrysalidiformis*

Shell cylindric.....*macra*

Summit of the whorls without a brown band.

Exterior of shell rough.....*villosa*

Exterior of shell not rough.

Parietal wall straw-color.

Shell thin, diaphanous.....*rarius*

Shell not thin or diaphanous.....*enodosa*

Parietal wall brown.....*fuscata*

COCHLOSTYLA (CHRYSTALLIS) CHRYSLIDIFORMIS CHRYSLIDIFORMIS (Sowerby)

PLATE 108, FIGURE 5

1833. *Bulinus chrysalidiformis* SOWERBY, Proc. Zool. Soc. London, 1833, p. 37.
 1833. *Bulinus chrysalidiformis* SOWERBY, The conchological illustrations, pl. 30, fig. 28.
 1836. *Bulinus chrysalidiformis* MÜLLER, Synopsis . . . testaceorum viventium . . . , p. 26.
 1838. *Bulinus chrysalidiformis* DESHAYES, Lamarek's Histoire naturelle des animaux sans vertèbres, ed. 2, vol. 8, p. 278.
 1841. *Bulinus chrysalidiformis* BRODERIP, Proc. Zool. Soc. London, 1840, p. 86; in part.
 1848. *Bulinus chrysalidiformis* PFEIFFER, Monographia heliceorum viventium, vol. 2, p. 76.
 1848. *Bulinus chrysalidiformis* REEVE, Conchologia iconica, pl. 4, fig. 16.
 1850. *Bulinus (Chrysalis) chrysalidiformis* ALBERS, Die Heliceen, ed. 1, p. 141.
 1851. *Bulinus chrysalidiformis* DESHAYES, Férussac's Histoire naturelle . . . mollusques . . . , vol. 2, pp. 56-57 (in part), pl. 149, figs. 10-11.
 1855. *Bulinus chrysalidiformis* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, ed. 2, vol. 1, Abt. 13, Theil 1, pp. 201-202, pl. 57, fig. 3.
 1855. *Cochlostyla (Chrysalis) chrysalidiformis* H. and A. ADAMS, The genera of recent Mollusca, vol. 2, p. 143.
 1856. *Bulinus chrysalidiformis* PFEIFFER, Malakozool. Blätter, vol. 2, p. 150.

1860. *Chrysallis chrysalidiformis* MARTENS, Albers, Die Heliceen, ed. 2, p. 179.
1892. *Cochlostyla chrysalidiformis* PILSBRY, Man. Conch., ser. 2, vol. 8, p. 51, pl. 14, fig. 64.
1895. *Helicostyla chrysalidiformis* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 231.
1897. *Cochlostyla chrysalidiformis* HIDALGO, Journ. Conchyl., vol. 44, pp. 247, 263, 271, 322, 331, 340, 350.
1898. *Cochlostyla chrysalidiformis* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 146.
1901. *Cochlostyla chrysalidiformis* HIDALGO, Obras malacologicas, pp. 550-551 (in part), pl. 105, fig. 3; pl. 155, fig. 9.
1914. *Cochlostyla (Chrysallis) chrysalidiformis* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 335-336, pl. 75, figs. 1, 2.
1932. *Cochlostyla (Chrysallis) chrysalidiformis chrysalidiformis* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 339.
1933. *Helicostyla (Chrysallis) chrysalidiformis* CLENCH and ARCHER, Papers Michigan Acad. Sci., Arts, Letters, vol. 17, p. 552.

Shell elongate-ovate, with a thin, translucent, yellowish periostracum, which is marked by axial hydrophanous streaks that extend up to the summit of the whorls across the brown bands, where they give to the shell an almost denticulated appearance. When the periostracum is removed the shell is soiled flesh-color, and has a moderately broad brown zone immediately below the summit and this zone extends up to the nuclear whorls to the very beginning of the shell, becoming increasingly narrower. The peristome is fringed by a pale purplish chocolate zone, which also marks more or less distinctly the outer edge of the parietal callus. The interior of the aperture is bluish white. Nuclear whorls 2.5, smooth, except a little frilling at the summit; the postnuclear markings, particularly the hydrophanous zones, carry over at least half of the nucleus. The postnuclear whorls are moderately rounded, almost appressed at the summit, and marked by low, rather broad, closely spaced, irregular, slightly retractively curved, axial riblets, which give to the surface of the shell a rather rough appearance. These riblets, or exaggerated growth lines, extend over the base to the umbilical region. The periphery of the last whorl shows as a decidedly obsolete angle. Aperture oval. Outer lip rather strongly reflected, thin; the inner lip with a decided twist, almost amounting to a tooth, expanding basally into a broad callus, which is reflected over the base and extends over the parietal wall as a thin callus.

The specimen described and figured (U.S.N.M. no. 14354) is one received from Cuming. It has 7.5 whorls and measures: Length, 69 mm; greater diameter, 30 mm. Another, bearing the same catalog number, has 6.9 whorls and measures: Length, 62.7 mm; greater diameter, 32 mm.

In addition we have seven specimens and a young example, none of which bears a specific locality: Two from the Jay collection (U.S.N.M.

no. 104355) have 7.1 and 6.9 whorls and measure: Length, 71.6 and 60 mm; greater diameter, 31.5 and 39.2 mm, respectively. Two (U.S.N.M. no. 104050) collected by Rich (who was on the U. S. Exploring Expedition, but the expedition touched only at the southern end of the island) have 7.5 and 7.2 whorls and measure: Length, 66.1 and 63.3 mm; greater diameter, 29.7 and 27.2 mm, respectively. Two and a young specimen (U.S.N.M. no. 20348) collected by the Exploring Expedition, probably also were purchased in Manila. One of these has 7.5 whorls and measures: Length, 74.8 mm; greater diameter, 33 mm. The other adult specimen has an injured tip and so was not measured. U.S.N.M. no. 109467, from the Redfield collection, has 7.1 whorls and measures: Length, 66 mm; greater diameter, 31.7 mm.

Sowerby, in describing this species, stated that it came from Central America. The Cuming specimens probably all came from north-eastern Mindoro.

COCHLOSTYLA (CHRYSTALLIS) CHRYSALIDIFORMIS MACRA Bartsch

PLATE 108, FIGURE 6

1932. *Cochlostyla (Chrysalis) chrysalidiformis macra* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 339.

Shell very slender, pupiform, covered with a pale straw-colored periostracum, which is crossed by axial, somewhat zigzag, retractively curved, hydrophanous zones that extend upon the dark band at the summit as false teeth. The early whorls are darker in color than the last two-thirds of the shell. When the periostracum is removed a brown zone is apparent immediately below the summit on all the turns. The outer edge of the reflected peristome is of a bright reddish-brown tone, and so is the outer edge of the columella and parietal callus. The interior of the aperture is white. Nuclear whorls about 2.5, smooth. The postnuclear whorls are moderately rounded, marked by strong, somewhat rough, retractively slanting lines of growth, which almost attain the strength of riblets and which extend over the base to the umbilical area. The sculpture is a little weaker than in the typical race. The summit of the whorls is appressed, and the suture is but slightly constricted. The periphery is well rounded. The aperture is irregularly auriculate. The peristome is expanded and reflected, that of the inner lip being broadly expanded at the insertion of the inner lip and reflected over the umbilicus, leaving only a narrow chin. It extends over the parietal wall as a thin callus.

The type (U.S.N.M. no. 382969) is without specific locality. It has 8 whorls and measures: Length, 74 mm; greater diameter, 24.7 mm.

The extreme slenderness of this race distinguishes it from the other forms.

COCHLOSTYLA (CHRYSTALLIS) CHRYSALIDIFORMIS VILLOSA Bartsch

PLATE 108, FIGURE 2

1841. *Bulinus chrysalidiformis* var. *d* BRODERIP, Proc. Zool. Soc. London, 1840, p. 86.
1892. *Cochlostyla chrysalidiformis* PILSBRY, Man. Conch., ser. 2, vol. 8, p. 52 (in part), pl. 14, fig. 65.
1901. *Cochlostyla chrysalidiformis* var. *D* HIDALGO, Obras malacologicas, p. 551, pl. 105, fig. 4.
1932. *Cochlostyla (Chrysalis) chrysalidiformis villosa* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 339.

Shell elongate-ovate. The early whorls are white, the later whorls covered with a pale straw-colored periostracum, which is crossed at more or less regular intervals by axial hydrophanous bands. The base is colored like the preceding portion of the last turn. Aperture and peristome white. Nuclear whorls 2.2, well rounded, smooth except for a few lines of growth. The postnuclear whorls are moderately rounded, appressed at the summit, and marked by rather rough, somewhat wrinkled, flattened, axial riblets, which are of irregular strength and spacing and extend to the umbilical chink. Suture slightly constricted. The periphery is feebly obsoletely angulated. Aperture auricular; the outer lip broadly expanded and reflected; the inner lip also broadly expanded at its insertion and reflected over the umbilicus, extending as a thin callus over the parietal wall.

The type (U.S.N.M. no. 315858) comes from the Evezard collection and is labeled merely "Philippines." It probably belongs in north-eastern Mindoro. It has 7.1 whorls and measures: Length, 66.8 mm; greater diameter, 31.2 mm.

This shell in general shape and sculpture resembles most nearly typical *Cochlostyla chrysalidiformis chrysalidiformis*, being a little rougher in sculpture and lacking the dark colored band at the summit and the dark edge to the lip. It can be distinguished from *Cochlostyla chrysalidiformis enodosa* by its larger size, more elongate form, and stronger sculpture.

COCHLOSTYLA (CHRYSTALLIS) CHRYSALIDIFORMIS RARIOR Bartsch

PLATE 108, FIGURE 4

1932. *Cochlostyla (Chrysalis) chrysalidiformis rarior* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 339.

The shell is very thin, diaphanous, elongate-conic, pupiform. The early whorls and the interior of the aperture and peristome are milk white. The postnuclear whorls are covered with a thin, translucent, yellowish periostracum, which is marked by pale buff, retractively slanting, fulgurations. Nuclear whorls 3, forming a moderately elevated apex, marked by retractively slanting lines of growth, which are strongest on the last turn where they render the summit slightly

crinkled. The last whorl is also marked by closely spaced, incised, spiral striations. The postnuclear whorls are appressed at the summit, moderately rounded, marked by retractorily slanting lines of growth and closely spaced, microscopic, spiral striations and still finer criss-cross sculpture, which cuts the lines of growth obliquely and is present on both spire and base. Suture slightly constricted. The periphery is feebly obsoletely angulated. The base is rather long, well rounded. Aperture oval. The peristome is strongly expanded and reflected; columella broadly expanded at its insertion and reflected to form the umbilical chink. The parietal wall is covered by a rather thick callus.

The type (U.S.N.M. no. 313644), collected by Pedro de Mesa at Calawagan, Paluan, Mindoro, has 7.1 whorls and measures: Length, 63.8 mm; greater diameter, 29 mm; lesser diameter, 24 mm.

U.S.N.M. no. 313645 contains eight topotypes received from the same source, seven of which yield the following measurements:

Number of whorls	Length	Greater diameter	Lesser diameter
	<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
7.0-----	56.4	28.1	23.8
6.4-----	51.5	26.4	22.1
7.0-----	58.5	27.9	29.0
6.3-----	49.1	25.9	22.3
6.1-----	42.4	23.7	20.3
6.5-----	60.7	30.3	24.9
6.5-----	59.5	26.5	23.4
6.54 ¹ -----	¹ 54.0	¹ 26.97	¹ 23.68
7.0 ² -----	² 60.7	² 30.3	² 29.0
6.1 ³ -----	³ 42.4	³ 23.7	³ 20.3

¹ Average.

² Greatest.

³ Least.

This race is remarkable for the extreme thinness of its shell and for the enormous variation in size in the different specimens, as brought out by the table of measurements.

COCHLOSTYLA (CHRYSTALLIS) CHRYSALIDIFORMIS ENODOSA Bartsch

PLATE 108, FIGURE 3

1932. *Cochlostyla (Chrysalis) chrysalidiformis enodosa* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 339.

Shell ovate, apparently in perfect specimens covered by a golden-yellow periostracum; at least this is indicated by a few shreds that are left on our shells and also by the part covered by the parietal callus. The only specimen before me is badly denuded. The peristome and aperture are white. The nuclear whorls are well rounded, smooth. The postnuclear whorls are moderately rounded and appressed at the summit, separated by a slightly constricted suture.

Periphery of the last whorl well rounded. Aperture oval. Outer lip moderately expanded and reflected; inner lip broadly expanded at its insertion and reflected over the umbilicus, extending over the parietal wall as a rather heavy callus.

The type (U.S.N.M. no. 382970) was collected by the Exploring Expedition, probably in the southern tip of the island of Mindoro where the expedition made a landing. It has 6.9 whorls and measures: Length, 59.8 mm; greater diameter, 28.9 mm.

This form is nearest related to *Cochlostyla chrysalidiformis villosa*, from which it can easily be distinguished by its more ovate form and much less strongly developed sculpture.

COCHLOSTYLA (CHRYSTALLIS) CHRYSALIDIFORMIS FUSCATA Bartsch

PLATE 108, FIGURE 1

1932. *Cochlostyla (Chrysalis) chrysalidiformis fuscata* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 340.

Shell elongate-ovate, with a rather regularly conic spire. The early whorls are flesh-color, the succeeding turns gradually becoming more yellow and tending to orange on the last volution. The parietal wall is covered by a pale-brown callus. Peristome soiled white. The interior of aperture is white with a grayish tinge. In addition there are hydrophanous bands extending from the summit, which they render falsely denticulate, to the umbilical chink. Nuclear whorls 2.2, well rounded, smooth. The postnuclear whorls are only slightly rounded; the last one is very feebly obsoletely angulated at the periphery, with the base well rounded. The whorls are appressed at the summit and marked by rather weak, irregularly developed, retractively slanting, closely spaced lines of growth, which extend to the umbilical chink at the last turn. Suture but slightly constricted. Aperture rather broadly oval. The outer lip is slightly expanded and reflected; the inner lip is rather broadly expanded and reflected over the base as a thick callus. The parietal wall is covered by a thin translucent callus, which permits the brown parietal wall to shine through.

The type (U.S.N.M. no. 382971) was collected by Lieutenant Febiger. It has 6.8 whorls and measures: Length, 70.7 mm; greater diameter, 32.4 mm.

No specific locality is given, but the specimens are labeled *Cochlostyla mindoroensis* and are from the Lea collection, which would indicate that they came from Mindoro.

Two additional specimens (U.S.N.M. no. 104356), from the same source, have 6.2 and 7 whorls and measure: Length, 58.7 and 60.1 mm; greater diameter, 28.9 and 34 mm, respectively.

COCHLOSTYLA (CHRYSTALLIS) JAYI Bartsch

1932. *Cochlostyla (Chrysalis) jayi* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 340.

Shell pupiform, almost cylindro-conic, rather heavy. The apex varies in color from white to dark chestnut-brown. The early post-nuclear whorls are considerably lighter than the later turns. The postnuclear whorls are covered by a moderately thick periostracum, which may be axially banded, streaked, blotched, spotted, or fulgurated with yellowish buff. These markings extend to the umbilical chink on the last whorl. The aperture is bluish white or pinkish white, while the expanded and reflected peristome may be soiled white, brownish, or almost black with an iridescent blue reflection. Nuclear whorls usually 3, well rounded; the first one is smooth, those succeeding are marked by fine incremental lines. The postnuclear whorls are appressed at the summit, moderately well rounded, and marked by irregular, low, closely approximated, threadlike lines of growth and also by obsolete indications of spiral striations and fine criss-cross microscopic lines that cut the lines of growth obliquely. The base is sculptured like the spire. The aperture is oval, oblique, almost auricular, with the peristome decidedly expanded and reflected. That of the inner lip broadly expanded at the insertion of the columella where it is reflected over the base to almost cover the umbilicus. The parietal wall is covered by a moderately thick callus. The number of whorls varies between 7 and 8. The detailed measurements are given under the races here recognized.

Of this species I am now recognizing three subspecies, two of which are bright chestnut-brown in the dark coloration, while the third is much darker. The two paler-colored subspecies have brown lips, while the dark one has an almost black lip with a purplish tinge. The first of these, typical *Cochlostyla (Chrysalis) jayi jayi*, comes from northeastern Mindoro; the second, corresponding with this in color, comes from Calawagan near Paluan in northwestern Mindoro; while the dark-colored race occupies an intermediate position on the north coast centering about Abra de Ilog.

KEY TO THE SUBSPECIES OF COCHLOSTYLA (CHRYSTALLIS) JAYI

The ground color of the last whorl bright chestnut-brown.

Shell large, length more than 70 mm..... *jayi*

Shell not large, length less than 65 mm..... *perpusilla*

The ground color of the last whorl almost blackish brown..... *camorongana*

COCHLOSTYLA (CHRYSTALLIS) JAYI JAYI Bartsch

PLATE 109, FIGURE 6

1839. *Bulimus ustulatus* JAY, Catalogue of recent shells in the cabinet of John C. Jay, ed. 2, p. 119, pl. 6, fig. 1.

1841. *Bulinus chrysalidiformis* var. *a* and *b* BRODERIP, Proc. Zool. Soc. London, 1840, p. 86.
1848. *Bulinus chrysalidiformis* REEVE, Conchologia iconica, pl. 4, fig. 16b; in part.
1851. *Bulinus chrysalidiformis* DESHAYES, Férussac's Histoire naturelle . . . mollusques . . ., vol. 2, pp. 56-57 (in part), pl. 149, figs. 5, 6.
1855. *Bulinus chrysalidiformis* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, ed. 2, vol. 1, Abt. 13, Theil 1, pp. 201-202 (in part), pl. 57, figs. 1, 2.
1859. *Chrysallis chrysalidiformis* CHENU, Man. Conch., vol. 1, p. 434, fig. 3194.
1891. *Cochlostyla chrysalidiformis* HIDALGO, Obras malacologicas, pp. 550-551. pl. 155, fig. 3; in part.
1892. *Cochlostyla chrysalidiformis* PILSBRY, Man. Conch., ser. 2, vol. 8, pp. 51-52 (in part), pl. 14, figs. 66, 67.
1892. *Cochlostyla chrysalidiformis ustulatus* PILSBRY, *ibid.*, pp. 51-52, pl. 14, figs. 66, 67.
1895. *Helicostyla chrysalidiformis ustulatus* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 231.
1896. *Chrysallis chrysalidiformis* var. *ustulata* ELERA, Catalogo sistematico de toda la fauna de Filipinas, vol. 3, p. 611.
1897. *Cochlostyla ustulata* HIDALGO, Journ. Conchyl., vol. 44, pp. 247, 322.
1898. *Cochlostyla chrysalidiformis ustulatus* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 146.
1898. *Cochlostyla ustulata* MÖLLENDORFF, *ibid.*, p. 146.
1901. *Cochlostyla chrysalidiformis* var. *c* HIDALGO, Obras malacologicas, pt. 1, pp. 550-551 (in part), pl. 105, fig. 3.
1914. *Cochlostyla chrysalidiformis ustulatus* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, p. 336, pl. 75. fig. 3.
1932. *Cochlostyla (Chrysallis) jayi jayi* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 340.

Through an evident oversight, Jay gave to this shell the name *Bulinus ustulatus* on page 119 of his Catalogue, forgetting *Bulinus ustulatus* Sowerby published in 1833 in Conchological Illustrations, figure 42, which Jay quotes on page 57 of his Catalogue, where he describes his shell as "1919b *Bulinus ustulatus* Sowb., Conch. Illust., fig. 42." The fact that most authors consider Jay's name a synonym of *Cochlostyla chrysalidiformis* (Sowerby) has been responsible for its not having been rechristened. I therefore have renamed it *Cochlostyla (Chrysallis) jayi*.

Shell large, pupiform, cylindro-conic, rather rough. The early whorls are flesh-color with a narrow brownish zone at the summit. This gradually changes through straw-color to bright chestnut-brown ground color and is crossed by hydrophanous axial zigzag bands of straw-color. This coloration also holds good on the base. The aperture is bluish white within, and the peristome and columella are livid with a purplish tinge. The parietal callus is thin and of the same color as the peristome. Nuclear whorls 2.8, well rounded, smooth. The postnuclear whorls are slightly rounded, appressed at the summit, and marked by retractively curved irregular lines of growth, which give to the surface a somewhat rough appearance, almost that of

being marked by closely spaced, flattened, threadlike riblets. The entire surface of the shell is marked by numerous fine, oblique, crisscross lines, which run obliquely across the lines of growth, both protractively and retractively. Both of these elements are of about the same strength and give to the surface a somewhat netted appearance when viewed under the microscope. The aperture is somewhat irregularly ovate, not infrequently oblique; the peristome is broadly expanded and reflected on the outer and basal lips. The inner lip is also broadly expanded, particularly so at the insertion of the columella, where it is reflected and adnate to the base but leaves behind its edge the umbilical chink. The parietal wall is glazed by a moderately thick callus.

The specimen described and figured (U.S.N.M. no. 104352) was collected by Cuming and therefore comes from the northeastern region of the island. It has 7.2 whorls and measures: Length, 70.6 mm; greater diameter, 31.2 mm.

Another specimen (U.S.N.M. no. 104353), also of Cuming's collecting, likewise has 7.2 whorls and measures: Length, 70.8 mm; greater diameter, 31.2 mm. There are eight additional specimens before me without specific localities.

Two specimens (U.S.N.M. no. 20350a) were obtained by the U. S. Exploring Expedition. These show considerable differences from those just described for the northern race. It is more than likely that they were obtained in the southern tip of Mindoro where the Exploring Expedition collected. However, they are too decorticated to serve as the basis for a description. The defining of the southern race will, therefore, have to await the arrival of more material.

COCHLOSTYLA (CHRYSTALLIS) JAYI PERPUSILLA Bartsch

PLATE 109, FIGURE 8

1932. *Cochlostyla (Chrysallis) jayi perpustakaan* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 340.

The shell is cylindro-conic. Nuclear whorls buff. The early post-nuclear whorls are very pale chestnut-brown; the last one is dark chestnut-brown fulgurated with almost vertical broad hydrophanous bands. The interior of the aperture and peristome are smoky bluish white, the latter being edged with brown. The columella has the same color scheme as the outer lip. The rest of the features are as in typical *Cochlostyla (Chrysallis) jayi jayi*, except that the aperture in the specimen before me seems more regular.

The type (U.S.N.M. no. 313685) was collected by Mr. de Mesa at Calawagan near Paluan, Mindoro. It has 7 whorls and measures: Length, 64.7 mm; greater diameter, 28.6 mm; lesser diameter, 24.7 mm.

Although I have only the type of this race before me, I believe that it is a perfectly well-recognized subspecies, differing from typical *Cochlostyla* (*Chrysallia*) *jayi jayi* in its much smaller size and its wide zoogeographical separation from the typical form, and that subsequent material will substantiate my contention.

COCHLOSTYLA (*CHRYSALLIS*) *JAYI CAMORONGANA* Bartach

PLATE 109, FIGURE 7

1932. *Cochlostyla* (*Chrysallia*) *jayi camorongana* BARTACH, Journ. Washington Acad. Sci., vol. 22, p. 340.

1933. *Helicostyla* (*Chrysallia*) *reticulata* CHENCH and ARCHER, Papers Michigan Acad. Sci., Arts, Letters, vol. 17, p. 551, pl. 58, fig. 6.

Shell pupoid, almost cylindro-conic. The nuclear whorls are of bluish color or dark chocolate-brown. The early postnuclear whorls are chestnut-brown, while the last turn is of almost blackish-brown ground color. The periostracum covering the postnuclear whorls is variegated with axial streaks, spots, dashes, or fulgurations of yellowish buff. The aperture is bluish white, and the broadly expanded and reflected peristome is almost black with a very bright iridescent bluish reflection. The triangle of the inner edge of the columella near its insertion is bluish smoky, while the parietal wall is covered with a transparent callus. Nuclear whorls 3, well rounded; the first smooth, the next showing incremental lines, while the last shows the sculpture of the postnuclear whorls. The postnuclear whorls are appressed at the summit and marked by low, rounded, closely approximated, somewhat irregularly developed lines of growth and numerous pale ill-defined spiral striations. In addition the usual fine microscopic criss-cross sculpture that cuts the lines of growth obliquely, both protractively and retractively, is present. The sculpture of the spire is also characteristic of the base. The aperture is oblique, subauricular; the inner lip is reflected over the umbilicus at its insertion.

The type (U.S.N.M. no. 313620) was collected by Pedro de Mesa at Camorong, Municipality of Abra de Ilog, northern Mindoro. It has 7.4 whorls and measures: Length, 73 mm; greater diameter, 28.8 mm; lesser diameter, 25.8 mm.

A series of topotypes, all collected by Mr. de Mesa, yields the measurements shown on the following page.

	S. N. M. No.	Number	Name	Place
313621				
313621				
313621				
313621				
313621				
313621				
313621				
313621				
313621				
313621				
313621				
313621				
313621				
313621				
313621				
313621				
313621				
313621				
313621				
Average.....				
Greatest.....				
Least.....				

COCHLOSTYLA (CHEMALLIN) LICHENSCHE WOOD.

Shell of medium size, elongate-ovate, rather smooth. The early whorls are pale brown, the last one of considerably darker ground color marked by fulgurations of yellowish-white axial bands. Interior of aperture bluish white edged with purplish brown, which also forms a zone at the outer edge of the parietal callus, while the callus itself is of the same color as the interior of the aperture. The post-nuclear whorls are slightly rounded, appressed at the summit, and marked by rather closely spaced lines of growth, which make the spaces between them look like flattened, slender, appressed threads. The entire surface of the shell is marked by numerous fine inclined lines, which cross the lines of growth obliquely both protractively and retractively and give to the surface, under the microscope, a finely fenestrated pattern. The aperture is broadly ovate, oblique, the peristome is decidedly expanded all around and reflected over the parietal wall as a heavy callus.

I am recognizing two subspecies of this species, *Cochlostoma lichenifer* (Mörcb), which I have not seen, and *Cochlostoma lichenifer arittata*, a race of which a specimen was collected by Dr. Edgar A. Mearns on the Mount Halcon Expedition. The two races can be distinguished as follows:

KEY TO THE SUBSPECIES OF COCHLOSTYLA (CHRYSALELLA) COCHLOSTYLINAE

Peripheral zone of brown present.....
Peripheral zone of brown absent.....

COCHLOSTYLA (CHRYSTALLIS) LICHENIFER LICHENIFER (Mörch)

PLATE 110, FIGURE 5

1850. *Bulimus lichenifer* MÖRCH, Catalogus conchyliorum quae reliquit C. P. Kierulf . . ., pp. 6, 29, pl. 1, fig. 3.
1853. *Bulimus lichenifer* PFEIFFER, Monographia heliceorum viventium, vol. 3, pp. 322-323.
1859. *Bulimus electricus* PFEIFFER, Monographia heliceorum viventium, vol. 4, p. 389; in part.
1860. *Bulimus lichenifer* MARTENS, Albers, Die Heliceen, ed. 2, p. 321.
1868. *Bulimus electricus* PFEIFFER, Monographia heliceorum viventium, vol. 5, p. 35; in part.
1876. *Bulimus lichenifer* PFEIFFER, Monographia heliceorum viventium, vol. 7, p. 50; in part.
1877. *Cochlostyla electrica* SEMPER, Reisen im Archipel der Philippinen, pt. 2, vol. 3, pp. 222; in part.
1887. *Cochlostyla electrica* HIDALGO, Journ. Conchyl., vol. 35, p. 174; in part.
1892. *Cochlostyla electrica* PILSBRY, Man. Conch., ser. 2, vol. 8, pp. 53-54 (in part), pl. 15, fig. 5.
1895. *Helicostyla electrica* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 231; in part.
1896. *Chrysallis electrica* ELERA, Catalogo sistematico de toda la fauna de Filipinas, vol. 3, p. 612; in part.
1897. *Cochlostyla lichenifer* HIDALGO, Journ. Conchyl., vol. 44, pp. 254, 281, 294.
1898. *Cochlostyla electrica* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 147; in part.
1901. *Cochlostyla electrica* HIDALGO, Obras malacologicas, pl. 155, fig. 5(?).
1914. *Cochlostyla electrica* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 339-340.
1932. *Cochlostyla (Chrysallis) lichenifer lichenifer* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 340.

Of *lichenifer* Mörch says: That it differs from *B. virgata* by having the shell opaque, more ventricose, and the axial lines conspicuous, the parietal callus heavy and white and the columellar fold oblique and twisted. He gives the length as 57 mm and the diameter as 25 mm. He describes varieties *a* and *b*. Of *a* he describes the shell as chestnut-color, the early whorls yellowish below, periostracum greenish yellow, marked by microscopic, wavy, closely spaced, transverse lines. There are a columellar and a peripheral band on the last whorl, which is also marked by oblique fulgurations, which are edged with yellow and covered with an inconspicuous periostracum. Peristome dark, even in semiadult specimens.

I have no specimens that can be referred to typical *Cochlostyla lichenifer*. A somewhat worn shell collected by Mearns belongs here but is sufficiently different to merit a distinct subspecific name.

COCHLOSTYLA (CHRYSTALLIS) LICHENIFER AVITTATA Bartsch

PLATE 110, FIGURE 4

1932. *Cochlostyla (Chrysallis) lichenifer avittata* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 340.

Shell elongate-ovate, rather slender. The early whorls dark, the middle ones flesh-color with a brownish tinge, the last one dark brown. Upon this ground color are placed slightly retractorily slanting fulgurations of pale flesh-colored axial bands having a yellowish tinge. The aperture is white with a livid tinge. The expanded peristome is bounded on the edge by a purplish zone, which also marks the edge of the parietal callus, the rest of the callus agreeing with the interior of the aperture. The postnuclear whorls are feebly rounded, appressed at the summit, and marked by very slender, retractorily curved axial threads, which are closely approximated and decidedly flattened, so that the spaces between them appear as mere lines. This sculpture extends also over the base. In addition the entire surface of the shell is marked by numerous microscopic, rather closely approximated crisscross lines, which pass obliquely over the lines of growth and give to the surface of the shell, when viewed under high magnification, a finely fenestrated appearance. The aperture is broadly ovate, decidedly oblique; the peristome is broadly expanded and reflected. The peristome of the inner lip is widest at its base, where it continues over the parietal wall as a heavy callus.

The type (U.S.N.M. no. 382972) was collected by Col. Edgar A. Mearns on Mount Halcon, Mindoro. It has the early whorls broken; the four remaining measure: Length, 61.8 mm; greater diameter, 28 mm.

COCHLOSTYLA (CHRYSTALLIS) ELECTRICA (Reeve)

Shell ovate. The first postnuclear whorls bluish, the rest flesh-color with the posterior half brown, which becomes the ground color of the rest of the turns. This ground color is covered by a periostracum of varying thickness and usually of yellowish tinge through which the axial fulgurations show. The aperture is brilliantly bluish white; peristome dark purplish brown at the edge gradually blending into the white of the interior. A zone of this color also covers the outer edge of the parietal callus, thus completely framing the aperture. The whorls are moderately rounded, appressed at the summit, and marked by fine retractorily slanting lines of growth and numerous microscopic crisscross lines, which cross the lines of growth obliquely and give to the surface, under the microscope, a somewhat reticulated pattern, but the *distinctive features* of the species appear to be curious wavy interrupted axial hydrophanous lines and spots, which give to the surface of the shell a vermiculated appearance that I have not seen in any of the other species.

I have not seen the typical race from Puerto Galera and shall have to quote description and figures of this from Reeve. I have, however, two races from the southern end of the island—one from the east coast

and one from the west coast—which are here described and figured. The following key will help to distinguish them:

KEY TO THE SUBSPECIES OF COCHLOSTYLA (CHRYSTALLIS) ELECTRICA

Light fulgurations broad and protractively slanting.....	electrica
Light fulgurations narrow and retractively slanting.	
Periostracum very thin; shell ovate.....	mangarina
Periostracum thick; shell narrowly ovate.....	bulalacaoana

COCHLOSTYLA (CHRYSTALLIS) ELECTRICA ELECTRICA (Reeve)

PLATE 109, FIGURE 5

1841. *Bulinus mindoroensis* var. *k* BRODERIP, Proc. Zool. Soc. London, 1840, pp. 85–86.
1851. *Bulimus electricus* REEVE, Conchologia iconica, pl. 5, fig. 21.
1853. *Bulimus electricus* PFEIFFER, Monographia heliceorum viventium, vol. 3, p. 326.
1856. *Bulimus electricus* PFEIFFER, Malakozool. Blätter, vol. 2, p. 150.
1859. *Bulimus electricus* PFEIFFER, Monographia heliceorum viventium, vol. 4, p. 389: in part.
1860. *Chrysallis electrica* MARTENS, Albers, Die Heliceen, ed. 2, p. 179.
1876. *Bulimus electricus* PFEIFFER, Monographia heliceorum viventium, vol. 7, p. 50; in part.
1877. *Cochlostyla electrica* SEMPER, Reisen im Archipel der Philippinen, pt. 2, vol. 3, p. 222; in part.
1887. *Cochlostyla electrica* HIDALGO, Journ. Conchyl., vol. 35, p. 174.
1892. *Cochlostyla electrica* PILSBRY, Man. Conch., ser. 2, vol. 8, pp. 51, 53–54 (in part), pl. 15, fig. 4.
1895. *Helicostyla electrica* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 231.
1896. *Cochlostyla electrica?* ELERA, Catalogo sistematico de toda la fauna de Filipinas, vol. 3, p. 612; in part.
1897. *Cochlostyla electrica* HIDALGO, Journ. Conchyl., vol. 44, pp. 254, 263, 268, 281, 294, 330, 331, 341, 350.
1898. *Cochlostyla electrica* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 147; in part.
1901. *Cochlostyla electrica* HIDALGO, Obras malacologicas, pt. 1, pp. 552–553; in part.
1914. *Cochlostyla electrica* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 339–340.
1932. *Cochlostyla (Chrysallis) electrica electrica* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 340.

"Shell somewhat elongately ovate, more ventricose in the middle, spire acuminate, whorls six in number, rather flatly convex, columella slightly twisted; livid red, epidermis rather thin, exhibiting very irregular obliquely waved pale streaks, aperture whitish, peritreme reddish brown.

"*Bulimus Mindoroensis*, var. *K*, Broderip.

"Hab. Puerto Galero, Island of Mindoro, Philippines (on the leaves of trees); Cuming.

"If any importance is to be attached to the character and pattern of the epidermis of these shells, there is certainly enough to distinguish this from the *B. Mindoroensis*. The epidermis is of a soft, very slight texture, of a uniform reddish brown tint in which light streaks descend here and there from the sutures in very zigzag course, somewhat as in *B. fulgetrum* but fainter; and, beside this, the shell is of a more acuminate growth, whilst the last whorl is larger and more effused."

This differs from the two races I have described by having the columella livid red; in the other two it is white edged with purplish brown.

Puerto Galera is in the northeastern part of the island. The other two came from the southeast and southwest, respectively.

COCHLOSTYLA (CHRYSTALLIS) ELECTRICA MANGARINA Bartsch

PLATE 109, FIGURES 1, 2

1892. *Cochlostyla electrica* PILSBRY, Man. Conch., ser. 2, vol. 8, pp. 51, 53-54 (in part), pl. 15, fig. 3.
1901. *Cochlostyla electrica* HIDALGO, Obras malacologicas, p. 553; in part.
1932. *Cochlostyla (Chrysalis) electrica mangarina* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 340.

Shell ovate. The first nuclear whorl is flesh-color; the rest have the posterior half brown. The postnuclear whorls are of bright chestnut-brown ground color, covered with a thin pale-gray periostracum, beneath which more or less continuous zigzag, retractorily slanting, axial, flesh-colored fulgurations pass over the whorls. These are strongest developed near the summit, where they appear almost as false teeth. There is a smooth peripheral zone of brown, apparently devoid of periostracum. The aperture is bluish white and the expanded peristome is edged with pale chocolate-brown, gradually fading toward the interior of the shell. This zone of chestnut-brown also extends over the edge of the inner lip and the edge of the parietal callus, thus completely bounding the peritreme. Nuclear whorls 2.4, the first two well rounded and smooth, the last half of the last turn showing the beginning of the postnuclear sculpture. The postnuclear whorls are rather well rounded, appressed at the summit, and marked by very feeble lines of growth. The usual crisscross, microscopic, closely spaced, incised lines that cut the lines of growth obliquely both protractorily and retractorily and numerous closely spaced dots and wavy vermiculated lines of white are present both on the spire and base. The periphery is feebly obsoletely angulated. Base somewhat inflated, well rounded. The aperture is broadly oval; outer lip strongly expanded and reflected; the inner lip also is expanded and very broadly so at its insertion, and reflected over the umbilicus, which it leaves as an open chink. The lip continues into a heavy parietal callus, which renders the peritreme complete.

The type (U.S.N.M. no. 382973) was collected by Quadras at Sitio Brucaan, Mangarin, southwest Mindoro. It has 6.4 whorls and measures: Length, 56.9 mm; greater diameter, 29.2 mm.

This species differs from typical *C. electrica electrica* in being more globose and in having the axial fulgurations retractively slanting. It differs from *C. electrica bulalacaoana* in being more globose and in having a much less heavy periostracum.

COCHLOSTYLA (CHRYSTALLIS) ELECTRICA BULALACAOANA Bartsch

PLATE 109, FIGURE 3

1901. *Cochlostyla electrica* HIDALGO, Obras malacologicas, p. 553; in part.

1932. *Cochlostyla (Chrysalis) electrica bulalacaoana* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 340.

Shell elongate-ovate. The first postnuclear whorl white; the next one showing at the summit the beginning of a brown zone, which rapidly spreads over the entire portion of the nuclear turns at their termination. From there on the ground color of the shell is chestnut-brown. The entire surface of the shell is overlain by a heavy yellowish-olive periostracum except at the peripheral zone and certain spots near the summit of the shell where the brown substratum shines through. Through this periostracum retractively slanting, moderately broad, zigzag, axial fulgurations are visible. The interior of the aperture is bluish white. The broadly expanded periostracum is reddish chocolate-brown. This is also the color of the outer half of the inner lip and the broad zone, marking the edge of the parietal callus. Nuclear whorls 2.8, well rounded, smooth except for the last half of the last whorl, which shows the beginning of the postnuclear sculpture. The post-nuclear whorls are slightly rounded, appressed at the summit and marked by feeble, closely spaced, flattened axial threads. The usual crisscross, obliquely placed, microscopic incised lines, which cut the lines of growth obliquely both protractively and retractively, are also present. There are also indications of fine spiral lines. In addition the surface is marked by fine, whitish, wavy vermiculations, which are closely spaced. These are best shown on the early postnuclear whorls, but become somewhat obscured in this race on the last turn. The base is marked like the spire. The aperture is broadly oval; outer lip broadly expanded and reflected; the inner lip is broadly expanded, especially at its insertion, and reflected over the umbilicus, which it leaves as a small chink. It extends over the parietal callus as a heavy callus, rendering the peritreme complete.

The type (U.S.N.M. no. 382974) was collected by Quadras at Boca de Cora, Bulalacao, southeastern Mindoro. It has 6.4 whorls and measures: Length, 61.2 mm; greater diameter, 30.6 mm.

The discussion of relationships with *C. electrica mangarina* will be found under that subspecies.

COCHLOSTYLA (CHRYSTALLIS) PALLIOBASIS Bartsch

PLATE 110, FIGURE 3

1932. *Cochlostyla (Chrysalis) palliobasis* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 340. (June.)

1932. *Helicostyla mcgintyi* SMITH, Nautilus, vol. 46, p. 63, pl. 4, figs. 1, 2. (Oct.)

1933. *Helicostyla (Chrysalis) mindoroensis orotis* CLENCH and ARCHER, Papers Michigan Acad. Sci., Arts, Letters, vol. 17, p. 549, pl. 58, fig. 1.

Shell pupoid. The nuclear whorls are pale buff. The early post-nuclear whorls are very pale brown, gradually deepening to light chestnut-brown on the last turn. This coloration stops abruptly at the periphery, and the base is buff shading gradually toward brown on the last half of the last turn. In addition to this ground color, the postnuclear whorls are fulgurated with rather broad hydrophanous olivaceous-buff axial markings. The anterior portion of the shell surrounding the umbilicus and the columella is blackish chestnut-brown. The interior of the aperture is bluish white, deepening on the outer lip and columella to decidedly bluish. Both the outer lip and the columella are edged with dark brown. The parietal wall is glazed with a thin translucent callus. Nuclear whorls 2.9, forming a moderately acute apex, well rounded, smooth, marked by retractorily curved lines of growth and the last one by fine spiral striations. The post-nuclear whorls are slightly rounded, appressed at the summit, and marked by retractorily slanting lines of growth and fine, closely spaced, microscopic spiral striations, which are present on both spire and base. Aperture broadly oval; peristome broadly expanded and reflected. The columella is also broadly expanded at its insertion and reflected to form the narrow umbilicus.

This species is most conspicuously distinguished from all the others by having the basal half pale buff as contrasted with the chestnut coloration of the upper portion of the last whorl.

The type (U.S.N.M. no. 313653) collected by Pedro de Mesa at Pinagabyan, Paluan, Mindoro, has 7.2 whorls and measures: Length, 61.7 mm; greater diameter, 27.7 mm; lesser diameter, 22.5 mm.

Four topotypes, also collected by Mr. de Mesa, entered as U.S.N.M. no. 313656, yield the following data:

Number of whorls	Length	Greater diameter	Lesser diameter
7.1-----	<i>Mm</i> 63.2	<i>Mm</i> 29.7	<i>Mm</i> 25.0
7.2-----	57.4	26.7	22.2
7.0-----	58.2	28.2	24.1
7.0-----	53.2	25.2	22.0
7.07 ¹ -----	¹ 58.0	¹ 27.45	¹ 23.3
7.2 ² -----	² 63.2	² 29.7	² 25.0
7.0 ³ -----	³ 53.2	³ 25.2	³ 22.0

¹ Average.

² Greatest.

³ Least.

COCHLOSTYLA (CHRYSTALLIS) PETITI Bartsch

PLATE 109, FIGURE 4

1850. *Bulimus cailliaudi* PETIT, Journ. Conchyl., vol. 1, p. 404, pl. 13, fig. 3.
 1853. *Bulimus cailliaudi* PFEIFFER, Monographia heliceorum viventium, vol. 3, p. 323.
 1859. *Bulimus cailliaudi* PFEIFFER, Monographia heliceorum viventium, vol. 4, p. 383.
 1876. *Bulimus cailliaudi* PFEIFFER, Monographia heliceorum viventium, vol. 7, p. 269.
 1877. *Cochlostyla electrica* SEMPER, Reisen im Archipel der Philippinen, pt. 2, vol. 3, p. 222; in part.
 1895. *Helicostyla electrica* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 231; in part.
 1896. *Chrysallis electrica* ELERA, Catalogo sistematico de toda la fauna de Filipinas, vol. 3, p. 612; in part.
 1897. *Cochlostyla cailliaudi* HIDALGO, Journ. Conchyl., vol. 44, pp. 249, 250, 267, 268, 274, 281, 283, 293, 330, 335, 338, 351.
 1898. *Cochlostyla electrica* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 147; in part.
 1901. *Cochlostyla electrica* var. *cailliaudi* HIDALGO, Obras malacologicas, pt. 1, pp. 552-553 (in part), pl. 113, fig. 3.
 1914. *Cochlostyla electrica* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 339-340; in part.
 1932. *Cochlostyla (Chrysallis) petiti* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 340.
 1933. *Helicostyla mindoroensis cailliaudi* CLENCH and ARCHER, Papers Michigan Acad. Sci., Arts, Letters, vol. 17, pp. 545, 548-549.

The name *Bulimus cailliaudi* Petit, December 1850, was preoccupied by *Bulimus cailliaudi* Pfeiffer, published in August 1850 in the Zeitschrift für Malakozoologie, page 86, and I have rechristened it *Cochlostyla (Chrysallis) petiti*. I believe with previous authors that it comes near *Cochlostyla electrica* and *Cochlostyla lichenifer*, but I think that it is not specifically or even subspecifically related to either.

As I have not seen specimens, I copy Petit's description and figure.

"Shell oblong oval, very light. Interior of the aperture white, tinted with rose. Externally the shell is covered with a yellowish periostracum which is denser on the last whorl. Aperture very broad. The outer lip expanded and a little reflected, having the edge tawny rose colored, approaching the color of the dregs of wine.

"This species, which in some respects resembles *Bulimus sylvanus* and *Bulimus dryas*, has, nevertheless, characters of its own such as the presence of an umbilicus. Its texture too is less solid, and also differs in its number of whorls, its coloration and wider aperture."

COCHLOSTYLA (CHRYSTALLIS) ROLLEI Möllendorff

Shell very large. The nuclear whorls are flesh-color; the post-nuclear whorls are brown, variegated, streaked and spotted with yellowish or greenish-yellow axial bands. The surface is covered with

a thin periostracum that allows the banding to show through. The nuclear whorls are marked with transverse wrinkles on all but the first portion of the first turn. The postnuclear whorls are marked by retractively slanting, threadlike, depressed, closely approximated lines of growth, which extend from the summit to the umbilical chink. In addition the whorls are marked by fine crisscross lines, cutting the lines of growth obliquely, both protractively and retractively, but these lines are very feebly expressed and scarcely perceptible, even under the microscope. The base also usually presents fine, poorly developed, closely spaced, incised, spiral lines. The aperture is large and broadly oval. The peristome is reflected and brown, both on the outer lip and the columellar side. The parietal wall is covered by a brown callus.

This species is represented by four races in our collection. The typical one, coming from the Mount Halcon region, is conic in shape, in which respect it resembles the small race whose habitat I am not familiar with, while the other large race is more globose, with the whorls more inflated and with stronger markings, and comes from the Lake Naujan country.

All three of these are chestnut-brown in ground color. The fourth, coming from Mayabig, Baco, Mindoro, is almost of black ground color on the last whorl, and all the whorls are darker.

KEY TO THE SUBSPECIES OF *COCHLOSTYLA (CHRYSALLIS) ROLLEI*

Ground color chestnut-brown.

Shell large.

Shell elongate-ovate; axial bands narrow..... **rollei**

Shell ovate; axial bands broad..... **osborni**

Shell small..... **vexator**

Ground color almost black..... **nigra**

COCHLOSTYLA (CHRYSALLIS) ROLLEI ROLLEI Möllendorff

PLATE 110, FIGURE 6

1892. *Cochlostyla mindoroensis* PILSBRY, Man. Conch., vol. 8, pp. 52-53, pl. 15, figs. 1, 2.
 1898. *Cochlostyla rollei* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 146.
 1901. *Cochlostyla rollei* HIDALGO, Obras malacologicas, pp. 546-547; in part.
 1914. *Cochlostyla rollei* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 338-339, pl. 76, figs. 1-3.
 1932. *Cochlostyla (Chrysallis) rollei rollei* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 340.
 1933. *Helicostyla (Chrysallis) rollei* CLENCH and ARCHER, Papers Michigan Acad. Sci., Arts, Letters, vol. 17, p. 552.

Shell large, ovate. The early whorls are soiled flesh-color, those succeeding turning chestnut-brown and streaked with irregular areas of pale greenish yellow, hydrophanous, more or less interrupted axial

bands, which vary in size and regularity. The aperture is bluish within; the peristome is pale brown, which is also the color of the parietal callus. The surface of the shell is covered by a very thin periostracum, which allows the markings referred to before to shine through. Nuclear whorls 3, well rounded, smooth. The postnuclear whorls are well rounded, very slightly narrowly shouldered at the summit, and marked by retractively slanting, rounded, threadlike lines of growth, which are closely approximated and of irregular strength. The fine crisscross sculpture obliquely cutting the lines of growth is very feebly expressed. This sculpture also obtains on the base, where fine, closely spaced, microscopic, feebly incised spiral lines are also present. The periphery and base are inflated and well rounded. The aperture is large, very broadly oval. The peristome of the outer lip is thickened, expanded, and reflected. The peristome of the inner lip is also thickened and expanded, particularly at its insertion, where it continues over the parietal wall as a thick callus. The reflected inner lip leaves a broad umbilical chink.

This race differs from *Cochlostyla (Chrysallis) rollei osborni* in being more conic and less definitely streaked. It differs from *Cochlostyla (Chrysallis) rollei vezator* in being much larger, and from *Cochlostyla (Chrysallis) rollei nigra* in being much lighter.

The specimen described and figured is one of nine (U.S.N.M. no. 255868) collected by Col. Edgar A. Mearns on Mount Halcon, Mindoro. It has 6.2 whorls and measures: Length, 75.6 mm; greater diameter, 42 mm; lesser diameter, 34.2 mm. The other eight specimens yield the following measurements:

Number of whorls	Length	Greater diameter	Lesser diameter
	<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
6.2-----	74.5	42.2	34.3
6.0-----	68.2	41.3	34.6
6.1-----	68.3	40.2	33.8
6.0-----	63.3	37.8	32.5
6.0-----	71.2	41.8	32.8
6.0-----	67.6	41.1	32.4
6.0-----	67.7	38.5	34.0
6.1-----	71.6	40.7	34.6

COCHLOSTYLA (CHRYSALLIS) ROLLEI OSBORNI Bartsch

PLATE 110, FIGURE 7

1901. *Cochlostyla rollei* HIDALGO, Obras malacologicas, pp. 546-547 (in part), pl. 127, figs. 1, 2.

1932. *Cochlostyla (Chrysallis) rollei osborni* BARTSCH, Journ. Washington Acad. Sci., vol. 22, pp. 340-341.

Shell large, ovate. The early whorls soiled flesh-color, the succeeding turns brown marked by rather broad, oblique, soiled yellow, more or less interrupted, and sometimes fulgurated axial bands. The aperture is pearly within, the peristome of the outer and inner lips and parietal callus being brown. The nuclear whorls are well rounded and marked by transverse closely spaced wrinkles, which really represent the beginning of the postnuclear sculpture. The postnuclear whorls are inflated and strongly rounded and very narrowly shouldered at the summit. They are marked by closely spaced, low, rather irregular, retractively slanting, threadlike riblets, which are about as wide as the spaces that separate them and which extend from the summit to the umbilical chink. In addition the surface of the shell is marked by fine crisscross sculpture, which passes obliquely over the axial threads. The incised spiral lines on the base are scarcely perceptible. The periphery is marked by an obsolete angle. The aperture is very broadly ovate. The outer lip moderately expanded and reflected. The inner lip is broadly reflected at its insertion; the parietal wall is covered by a moderately thick callus.

The type (U.S.N.M. no. 300823) was collected by Dr. Osborn at Lake Naujan, Mindoro. It has 6.1 whorls and measures: Length, 70.3 mm; greater diameter, 42.2 mm.

Two additional specimens (U.S.N.M. no. 313550), also from the Lake Naujan region, were collected by the Worcester and Bourns expedition; they have 6 whorls each and measure: Length, 71.5 and 71.3 mm; greater diameter, 40.2 and 44 mm, respectively.

COCHLOSTYLA (CHRYSALLIS) ROLLEI VEXATOR Bartsch

PLATE 110, FIGURE 1

1932. *Cochlostyla (Chrysallis) rollei vexator* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 341.

Shell small, ovate. The nuclear whorls are flesh-color; the early postnuclear whorls also flesh-color with a narrow zone of brown at the summit. The antepenultimate whorl is pale brown, shading rapidly to chestnut-brown on the last turn. The interior of the aperture is pearly gray with the peristome bright chestnut-brown, which is also the color of the parietal callus. The early whorls have slight indication of axial lighter zones, particularly at the summit, where they appear as slender false teeth. The later whorls, particularly the last one, are crossed by strongly marked, oblique, pale greenish-yellow, axial bands, which vary considerably in width and regularity of outline. Nuclear whorls 2.3, well rounded, the last portion showing the beginning of the postnuclear threadlike sculpture. The postnuclear whorls are only moderately rounded, slightly shouldered at the summit, and crossed by numerous rather irregular, retractively

slanting, threadlike riblets, which give to the surface of the shell a rather rough and somewhat shaggy appearance. There are also indications of poorly expressed, fine, spiral striations, which are best shown on the base. The fine zigzag sculpture is exceedingly minute. Aperture oval; outer lip moderately expanded and reflected; the inner lip partly expanded at its insertion where it flows into the parietal callus.

The type (U.S.N.M. no. 104348) was received from the Lea collection and is labeled *Helix mindoroensis*, without specific locality label. It has 6.2 whorls and measures: Length, 57.7 mm; greater diameter, 30.8 mm.

This is an exceedingly small race undoubtedly belonging to the *rollei* complex.

COCHLOSTYLA (CHRYSTALLIS) ROLLEI NIGRA Bartsch

PLATE 110, FIGURE 2

1932. *Cochlostyla (Chrysallis) rollei niger* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 341.

Shell huge, ovate. The early nuclear whorls are flesh-color, the succeeding ones pale chestnut-brown, which is also the color of the first two postnuclear whorls, the last one being very dark, almost blackish, brown. The postnuclear whorls are covered by a rather strong periostracum, which is marked by hydrophanous bands of varying widths and shape, the pattern of the basal portion being frequently quite different from that of the spire. The hydrophanous markings are olivaceous-buff. The interior of the aperture is pale blue; the peristome is very dark chocolate-brown, which is also the color of the outer edge of the columella, the inner portion of the columella gradually changing through smoky gray to bluish white at its inner edge. Nuclear whorls 3, the first almost flattened, moderately rounded, the succeeding turns moderately rounded and marked by incremental lines, which gradually increase in strength. The last whorl also shows incised spiral lines. The postnuclear whorls are somewhat inflated, well rounded, appressed at the summit, and marked by retractorily curved, threadlike, incremental lines and numerous rather strong incised spiral striations and the usual criss-cross sculpture, which here also is somewhat intensified and present on both spire and base. The suture is moderately impressed. The periphery is obsoletely angulated. The base is inflated, strongly rounded, and rather openly umbilicated. The aperture is broadly oval; the outer lip is expanded and reflected. The inner lip also is broadly expanded and reflected, half covering the umbilicus. The parietal wall is covered by a rather thick callus.

This race differs from the other three races in being much darker and in having the spiral sculpture decidedly more pronounced.

The type (U.S.N.M. no. 313721) was collected by Pedro de Mesa at Mayabig, Baco, Mindoro. It has 6 whorls and measures: Length, 70.1 mm; greater diameter, 42.3 mm; lesser diameter, 33.8 mm.

The following specimens yield additional data:

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
313661.....	6. 0	69. 1	37. 0	31. 0
313661.....	5. 6	62. 1	38. 7	33. 0
313661.....	5. 6	68. 3	37. 5	33. 1
313661.....	5. 0	65. 4	40. 4	33. 8
313661.....	5. 7	69. 9	37. 7	33. 4
313661.....	5. 3	70. 9	39. 9	33. 5
313661.....	5. 5	68. 2	40. 9	34. 2
313661.....	5. 6	75. 2	39. 7	35. 0
313661.....	5. 8	78. 7	45. 7	37. 3
313661.....	5. 7	73. 5	41. 0	34. 1
313661.....	5. 5	75. 4	40. 3	34. 4
313661.....	5. 2	62. 8	35. 2	29. 5
313661.....	5. 3	66. 5	38. 4	32. 8
313661.....	5. 6	74. 1	40. 8	32. 8
313661.....	5. 1	68. 6	41. 6	36. 0
313661.....	5. 5	71. 8	38. 9	34. 5
313661.....	5. 2	65. 7	39. 4	33. 6
313661.....	5. 1	65. 2	36. 7	31. 8
313661.....	5. 2	63. 1	36. 7	32. 4
313697.....	5. 4	75. 4	43. 1	37. 0
313697.....	5. 6	71. 5	41. 0	36. 3
313697.....	5. 2	72. 7	42. 1	37. 0
313697.....	5. 3	75. 0	41. 9	35. 5
313697.....	5. 4	68. 1	40. 0	34. 7
313697.....	5. 7	77. 5	40. 4	34. 7
313697.....	5. 5	67. 4	39. 5	34. 4
313697.....	5. 5	66. 9	39. 8	34. 2
313697.....	5. 4	67. 5	37. 6	32. 7
313697.....	5. 6	74. 2	43. 7	37. 5
Average.....	5. 45	70. 0	39. 85	34. 14
Greatest.....	6. 0	78. 7	45. 7	37. 5
Least.....	5. 0	62. 1	35. 2	29. 5

COCHLOSTYLA (CHRYSTALLIS) ALBOLABRIS Bartsch

1932. *Cochlostyla (Chrysallis) albolabris* BARTSCH, Journ. Washington Acad. Sci. vol. 22, p. 341.

Shell of medium size. The nuclear whorls are flesh-color; the early postnuclear whorls have a narrow zone of brown at the summit. The later ones are of chestnut-brown ground color, marked by variously slanting axial zones and fulgurations of yellowish buff, which extend to the umbilical region in the last whorl. Interior of the aperture bluish white, with the peristome white, bearing, however, at the very edge a brownish zone. The early nuclear whorls are smooth; the

later ones marked by growth lines. The postnuclear whorls are somewhat inflated, rather strongly rounded, narrowly shouldered at the summit, and marked by retractively slanting lines of growth, which are rather irregular and irregularly spaced. They are not quite threadlike. The usual fine zigzag sculpture cuts these lines obliquely, both protractively and retractively, on both spire and base. The aperture is rather large, oval. The outer lip is reflected and expanded; inner lip also expanded, particularly at its insertion, where it is reflected over the umbilicus leaving only a narrow open chink. The parietal wall is covered with a moderately strong callus.

This species is most nearly related to *Cochlostyla rollei*, from which it differs in having the peristome white and the aperture larger and in being much smaller.

There are apparently two races before me, one specimen of which was collected by Cuming and the other by Lieutenant Febiger. Neither one bears locality data.

KEY TO THE SUBSPECIES OF COCHLOSTYLA (CHRYSTALLIS) ALBOLABRIS

Shell ovate.....	robusta
Shell elongate-ovate.....	albolabris

COCHLOSTYLA (CHRYSTALLIS) ALBOLABRIS ROBUSTA Bartsch

PLATE 111, FIGURE 5

1932. *Cochlostyla (Chrysalis) albolabris robusta* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 341.

Shell moderately large, ovate, rather stout. Only the last two nuclear whorls remain, the first one being lost. The first postnuclear whorl is buff with a narrow zone of brown; the succeeding postnuclear whorls are chestnut-brown, variegated with zones and fulgurations of yellowish buff, which are, however, very poorly developed in this race, showing best on the posterior half of the turns, the base being more or less uniform brown. Aperture bluish white within. This coloration also extends over the expanded peristome, but there is a very narrow zone of brown bordering the outer lip and the columella. The postnuclear whorls are marked by rather strong, retractively slanting, almost threadlike incremental lines, which give to the surface of the shell a roughish appearance. These lines extend to the umbilical chink in the last turn. They are crossed by the fine microscopic zigzag sculpture, on both spire and base. There are also indications of feebly expressed fine spiral incised lines. The aperture very broadly oval; the outer lip strongly expanded and reflected; the inner lip also expanded—decidedly so at its insertion—where it is reflected over the umbilicus, of which it leaves only a chink. The parietal wall is covered by a rather heavy glaze.

The type (U.S.N.M. no. 104347) has lost its first whorl. The 5.1 remaining measure: Length, 63.5 mm; greater diameter, 37.9 mm.

The specimen was collected by Lieutenant Febiger. It has no specific locality data with it.

COCHLOSTYLA (CHRYSTALLIS) ALBOLABRIS ALBOLABRIS Bartsch

PLATE 111, FIGURE 6

1932. *Cochlostyla (Chrysalis) albolabris albolabris* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 341.

Shell elongate-ovate. The nuclear whorls white; the early post-nuclear whorls buff with a narrow brown band at the summit; the rest of the postnuclear whorls chestnut-brown marked by bands of yellowish buff, which vary decidedly in slant. On some parts of the whorls they are protractively and on other parts retractively slanting. They are also of irregular width and spacing and extend on the last turn from the summit to the umbilicus. Interior of aperture white with a bluish tinge. This color extends over the expanded peristome to the very edge, which is brownish. The shell is covered by a very thin periostracum. Nuclear whorls 3, the first well rounded, smooth; the next showing the beginning of lines of growth, which become intensified on the last nuclear whorl where they practically merge into the post-nuclear sculpture. The postnuclear whorls are marked by irregular lines of growth, which scarcely merit the term of threads. These are of irregular strength and spacing. They are also marked by microscopic crisscross sculpture, which cuts these lines of growth obliquely, both protractively and retractively, both on spire and base. The aperture is moderately large. The outer lip is expanded and reflected; the inner lip also expanded, broadly so at its insertion where it is reflected and leaves only a chink of the umbilicus. The parietal wall is covered by a thin callus, which permits the color pattern of the parietal wall to shine through, which protects the color pattern of the parietal wall with a translucent glaze.

The type (U.S.N.M. no. 104346) has 6.1 whorls and measures: Length, 61 mm; greater diameter, 32.7 mm.

COCHLOSTYLA (CHRYSTALLIS) ANTONI Semper

Shell ovate to elongate-ovate, varying in the known races from ovate to elongate-ovate. The nuclear turns and the early postnuclear whorls are flesh-color; the later turns are straw-color with hydrophanous bands of a little paler or darker shade. The entire surface of the shell is covered by a thin greenish-yellow periostracum. The aperture is white within and also white on the reflected peristome. The nuclear whorls are well rounded. The postnuclear whorls are marked by retractively slanting lines of growth, which are irregular in strength and spacing. There are also fine, somewhat crinkly, feebly incised, spiral

lines present on spire and base, and the entire surface is marked by the fine crisscross incised lines that cross the lines of growth obliquely. The aperture is rather large, broadly ovate, almost subcircular, with the peristome very broadly expanded and reflected. The peristome of the inner lip is very broadly expanded and reflected over the umbilicus, which it leaves as a narrow chink. The parietal wall is covered by a moderately thick callus.

I am recognizing two subspecies: One from the northern end of the island and the other from the southwestern part. The following key will readily help to distinguish them:

KEY TO SUBSPECIES OF COCHLOSTYLA (CHRYSTALLIS) ANTONI

Shell stout.....	antoni
Shell slender.....	macilenta

COCHLOSTYLA (CHRYSTALLIS) ANTONI ANTONI Semper

PLATE 111, FIGURE 1

1877. *Cochlostyla antoni* SEMPER, Reisen im Archipel der Philippinen, vol. 3, pt. 2, p. 223.
1891. *Cochlostyla antoni* HIDALGO, Obras malacologicas, pp. 547-548, pl. 105, fig. 1.
1892. *Cochlostyla chrysalidiformis antoni* PILSBRY, Man. Conch., ser. 2, vol. 8, p. 52.
1895. *Helicostyla chrysalidiformis antoni* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 231.
1896. *Cochlostyla chrysalidiformis antoni* ELERA, Catalogo sistematico de toda la fauna de Filipinas, vol. 3, p. 611.
1897. *Cochlostyla antonii* HIDALGO, Journ. Conchyl., vol. 44, pp. 263, 281.
1898. *Cochlostyla antoni* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 147.
1914. *Cochlostyla antoni* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 340-341, pl. 75, figs. 7, 8.
1932. *Cochlostyla (Chrysalis) antoni antoni* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 341.

Shell broadly ovate. The early whorls are white, gradually grading into the pale yellow of the last turn, which on the base assumes practically a lemon shade. The postnuclear whorls are also crossed by rather distantly spaced, hydrophanous, retractively slanting zones, which become less conspicuous when the periostracum is worn away. The interior of the aperture is white, which is also the color of the broadly reflected peristome. Nuclear whorls 2.8, well rounded, smooth, except the last turn and a half, which show fine incremental lines. The postnuclear whorls are appressed at the summit, moderately rounded, marked by rather irregularly developed and spaced, retractively slanting, incremental lines and fine feebly incised spiral lines, which are present on both spire and base. In addition there are present microscopic, crisscross, incised spiral lines, which cross the lines of growth obliquely. The periphery is well rounded, the base somewhat inflated. Aperture large, very broadly oval; the peristome broadly

expanded and reflected; that of the inner lip very broad at the insertion of the columella and reflected over the umbilicus, which appears only as a chink. A moderately thick callus connects the columella with the outer lip on the parietal wall.

The specimen described and figured (U.S.N.M. no. 315638) is one of two from the Evezard collection and is without specific locality data. It has 7 whorls and measures: Length, 68.5 mm; greater diameter, 36.1 mm. The other specimen has 6.9 whorls and measures: Length, 64 mm; greater diameter, 35.7 mm.

This race can readily be distinguished from the next by its much more ovate outline and more inflated whorls.

COCHLOSTYLA (CHRYSTALLIS) ANTONI MACILENTA Bartsch

PLATE 111, FIGURE 2

1914. *Cochlostyla antoni* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pl. 75, fig. 8.

1932. *Cochlostyla (Chrysalis) antoni macilentata* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 341.

Shell very elongate-ovate, thin. The early whorls are flesh-color gradually changing to pale lemon-yellow, marked by feeble, retractively slanting, axial, hydrophanous bands, which sometimes assume the form of fulgurations, and by very fine vermiculations, which are more or less axially disposed, a character in which this race resembles the races of *Cochlostyla electrica*. A very thin periostracum covers the entire surface of the shell. Nuclear whorls 3; the first is well rounded; from the second on, slender axial lines of growth become apparent. The postnuclear whorls are very slightly rounded, appressed at the summit, and marked by feeble, retractively slanting, somewhat wavy, lines of growth, which vary considerably in strength and spacing. There are also feeble, irregularly disposed, incised, spiral lines present, as well as the microscopic crisscross lines passing obliquely over the lines of growth. All these elements are present on spire and base. Periphery well rounded. The base is well rounded. Aperture broadly oval; peristome broadly expanded and reflected; the inner lip also broadly expanded, very much so at its insertion, where the reflected portion almost covers the umbilicus, leaving only a chink. The parietal wall is covered by a thick white callus.

The type (U.S.N.M. no. 313551) was collected by Quadras at Sitio Brucaan, Mangarin, Mindoro. It has 6.9 whorls and measures: Length, 63 mm; greater diameter, 32.4 mm.

This subspecies can readily be distinguished from *Cochlostyla antoni antoni* by its much slenderer form and also by the presence of vermiculations alluded to, which may some day cause it to be considered a distinct species.

OCHLOSTYLA (CHRYSALE), ROSEOLABRA Bartsch

Shell varying from elongate-conic to broadly ovate. The color varies from yellowish buff to pale wood brown; the early whorls are always lighter than the later ones. The interior of the aperture may be bluish white or bluish white with a purplish tinge, and the peristome may be pale rose-color or bright rose-color, varying with the subspecies in question. The shell is covered with a thin periostracum, which bears hydrophanous lines. These are most conspicuous near the summit of the whorls, which they render falsely toothed. Nuclear whorls almost 3, forming a blunt apex, marked by retractively curved axial lines of growth, which are strongest on the last turn. Here they assume almost the strength of those of the postnuclear whorls. The postnuclear whorls are moderately well rounded, appressed at the summit, marked in one of the races by rather strong, retractively curved, incremental lines. In fact in this race they almost resemble threads, while in the other this sculpture is decidedly reduced in strength and the shell is almost smooth. The periphery of the last whorl is feebly angulated. The base is rather inflated and strongly rounded. The periphery is broadly oval; the peristome is expanded and reflected. The inner lip also is reflected, the reflection forming a narrow umbilicus.

The species, as far as known at present, is confined to northwestern Mindoro. I am recognizing two subspecies, but there is an indication of still another one.

KEY TO THE SUBSPECIES OF OCHLOSTYLA (CHRYSALE), ROSEOLABRA

General color of shell yellowish buff.....	roseolabra
General color of shell wood brown.....	rosea

OCHLOSTYLA (CHRYSALE), ROSEOLABRA ROSEOLABRA Bartsch

PLATE 111, FIGURE 4

1932. *Ochlostyla (Chrysale), roseolabra roseolabra* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 341. (June.)
1932. *Helicostyla chrysalidiformis calayanensis* SMITH, Nautilus, vol. 46, p. 64, pl. 4, figs. 4, 6. (October.)
1933. *Helicostyla (Chrysale), mindoroensis flavipellis* CLENCH and ARCHER, Papers Michigan Acad. Sci., Arts, Letters, vol. 17, p. 548, pl. 18, fig. 5.

The shell is ovate. The early whorls are pale buff, the later ones buff with a yellowish tinge, marked by varicial streaks of pale brown, which are of irregular width and spacing. The postnuclear whorls are moderately curved with a thin olivaceous-yellow periostracum, which shows hydrophanous, retractively slanting, axial bands that give to the summit of the turns a smooth falsely toothed appearance. The interior of the aperture is bluish white, pearly. The broadly expanded peristome is pale rose-color. Nuclear whorls almost 3, forming a moderately acute apex. The first two are marked by fine incremental

lines, the last one by stronger lines of growth. In fact, on this whorl the sculpture is as strong as that of the postnuclear turns. The post-nuclear whorls are appressed at the summit, moderately strongly rounded, and marked by retractively slanting, incremental lines, which almost assume the strength of threads. They are rather irregular in strength and spacing. In addition there are rather coarse, incised spiral lines and the usual fine crisscross sculpture, which is extremely reduced in this race but is present on both spire and base. The periphery is feebly angulated, and the base is inflated and strongly rounded. The aperture is broadly oval. The peristome is decidedly expanded and reflected, the inner lip being reflected to form a moderately large umbilicus. The parietal wall is covered by a thin translucent callus.

This subspecies is distinguished from *Cochlostyla (Chrysallis) roseolabra rosea* by having the color of the lip and the general coloration much paler, as well as by the presence of incised spiral lines.

The type (U.S.N.M. no. 313677), collected by Pedro de Mesa at Calawagan, Paluan, Mindoro, has 5.9 whorls and measures: Length, 60 mm; greater diameter, 31.5 mm; lesser diameter, 27.9 mm.

Six topotypes (U.S.N.M. no. 313678) and 18 additional specimens yield the following measurements:

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
313678.....	6.1	62.7	31.0	26.6
313678.....	5.9	55.1	25.1	23.0
313678.....	5.1	45.2	26.4	24.0
313678.....	5.2	54.5	29.9	26.1
313678.....	5.7	56.3	28.5	25.1
313678.....	5.9	54.9	27.9	24.6
313646.....	5.8	51.5	26.6	23.3
313646.....	6.4	63.5	31.7	27.2
313646.....	6.0	52.1	25.4	23.0
313646.....	5.9	61.5	32.3	28.4
313646.....	5.4	58.0	24.7	24.8
313646.....	5.5	48.5	26.0	23.2
313646.....	5.5	53.6	26.8	24.8
313646.....	5.3	49.6	29.7	25.2
313646.....	5.2	46.4	25.6	23.4
313643.....	5.5	53.0	28.8	26.4
313643.....	6.0	57.9	26.4	22.0
313643.....	5.9	56.9	27.7	24.1
313643.....	5.4	47.5	26.3	23.0
313643.....	5.2	50.3	28.5	25.2
313679.....	5.0	45.1	27.0	24.3
313679.....	5.3	46.9	27.0	23.6
313679.....	5.7	49.6	25.9	23.7
313679.....	5.1	50.2	28.0	24.1
Average.....	5.58	52.95	27.6	24.5
Greatest.....	6.4	63.5	32.3	28.4
Least.....	5.0	45.1	24.7	22.0

COCHLOSTYLA (CHRYSTALLIS) ROSEOLABRA ROSEA Bartsch

PLATE 111, FIGURE 3

1932. *Cochlostyla (Chrysallis) roseolabra rosea* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 341.

Shell of medium size, ovate. The first two nuclear whorls are flesh-color, the last one pale wood brown. The postnuclear whorls are pale wood brown covered with a thin translucent pale-brown periostracum, which is marked by buff, hydrophanous, retractively slanting, axial bands and fulgurations that extend to the umbilical area of the base. These bands vary in width and spacing in different individuals. In some they are almost confluent. The aperture is bluish white with a purplish tinge within. The outer lip is bright rose-red, becoming more intense toward the outer edge. The same holds true of the columella. Nuclear whorls almost 3; the first is marked by lines of growth only, which become intensified until they almost form threads on the last portion of the last nuclear whorl. The nuclear spire is moderately acute. The postnuclear whorls are moderately rounded, appressed at the summit, and marked by retractively slanting, almost threadlike, axial lines of growth and feebly expressed spiral striations and by fine crisscross sculpture, which cuts the lines of growth obliquely. All these elements are present on both spire and base. Suture moderately constricted. Periphery obtusely angulated; aperture ovate. The outer lip is expanded and reflected; the inner lip also expanded, particularly at its insertion, and reflected to form the narrow umbilicus. The parietal wall is covered by a moderately thick callus.

The type (U.S.N.M. no. 313680), collected by Pedro de Mesa in the interior of Abra de Ilog, northwest Mindoro, has 6.3 whorls and measures: Length, 49.3 mm; greater diameter, 26.4 mm; lesser diameter, 22.6 mm.

Five topotypes (U.S.N.M. no. 313681) yield the following additional measurements:

Number of whorls	Length	Greater diameter	Lesser diameter
	<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
6. 4.....	53. 4	27. 1	23. 7
6. 4.....	54. 6	29. 0	24. 3
6. 0.....	47. 5	24. 8	20. 8
6. 1.....	49. 7	26. 7	22. 3
5. 9.....	45. 2	26. 2	22. 4
6. 16 ¹	¹ 50. 0	¹ 26. 76	¹ 22. 7
6. 4 ²	² 54. 6	² 29. 0	² 24. 3
5. 9 ³	³ 45. 2	³ 24. 8	³ 20. 8

¹ Average. ² Greatest. ³ Least.

I also have before me four specimens (U.S.N.M. no. 313655) collected by Pedro de Mesa at Calawagan, Paluan, Mindoro. These are in every way darker than the others but may belong here. More material, however, will decide the fate of this element.

The shells that have been listed under the name *Cochlostyla mindoroensis* (Broderip) belong to two phylogenetic stocks as evidenced by the color of their nuclear whorls, which are embryonic features. In one group we have a soiled-white tip; in the other, a purplish-brown tip.

Before adequate material was at hand I believed that we might be dealing with a hybrid mutating complex, resulting in the many forms that the island presents, but the constancy of the color of the nucleus, combined with equally constant sculptural characters and general color pattern in the material gathered from certain areas, convinces me that this is not the case. For any other groups, such as *Cerion*, where I have found hybridization to be the source of mutation where different colored embryonic whorls were present, the progeny showed those characters, that is, white or buff tipped in the offspring, without any relation to the rest of the shell characters; in other words, a light tip, let us say, a character of Species A, would appear on a shell having all the rest of the characters of the other pattern Species B, which has a buff tip, the color of the nucleus only indicating the relationship to Species A.

No such mix-ups are present here, and if the many forms of the variegated *Cochlostylas* of Mindoro are the product of hybridization, then this must have taken place so long ago that complete segregation and fixation have taken place.

We have a similar situation presented in *Amphidromus* in southern Palawan and the adjacent small islands of that region, where *Amphidromus quadrasi* and its races always have a white tip in their colony regardless of the other color features, and *Amphidromus versicolor* in all its races has a dark apex. Among thousands of specimens examined of these two species I have been unable to detect an exception. Each colony usually occupies a distinct island or, in the case of the large island Palawan, a distinct portion of it, and all its members definitely align themselves with one or the other species.

It is my firm belief that the Mindoro *Cochlostylas* present a similar state of affairs and that in the past naturalists lumped shells of a general resemblance in the catch-all *Cochlostyla mindoroensis* because they had insufficient material without definite locality labels as typified by the old collections in the National Museum. An examination of a large series of specimens from a given locality will show that they definitely belong to the light- or dark-tipped forms. A separation on this basis makes it easily possible to trace these over the island where each group breaks up into zoogeographic races.

I shall therefore consider that the nuclei proclaim two phylogenetic groups, which I shall call species and under which I shall recognize the known races, as subspecies. How constant these races are may be inferred from plate 115 representing *Cochlostyla caniceps caniceps*, in which I show a series of specimens taken at random from a collection made at Lake Naujan, to illustrate the constancy of character.

COCHLOSTYLA (CHRYSAEUS) ASPERSA (Grateloup).

It is unfortunate that this species cannot carry the name *Cochlostyla mindoroensis* under which the various races belonging to it are repeating in the existing collections. Grateloup evidently received from Cuming some specimens labeled *Bulinus mindoroensis* (Broderip) but he did not approve of this name and gave the species the name *Bulinus aspersa*, defining it, in the Actes de la Société Linnéenne, volume 11, page 164, in 1840, in a very few words and mentioning Manila as its habitat. A little later, in the same year and publication, pages 421-422, he redefines it and figures it on plate 4 as figure 3, in an unmistakable manner. He also here places as variety A his *Bulinus wagneri*, which in the previous paper he had believed to have come from Peru. Broderip's *Bulinus mindoroensis*, not being published until the following year, must necessarily, for priority reason, give way to Grateloup's older name.

In recognizing a number of zoogeographic races in the island of Mindoro of *Cochlostyla aspersa*, I am going to retain the name *mindoroensis* for one of the races, the one coming from the region of Puerto Galera, which agrees best with Reeve's figure, published on plate 4, figure 15, in the Conchologia Iconica. Reeve, being the first one to figure a representative under this name, may be considered as fixing it to the form in question, since Broderip has given us the wide range of varieties a-k in the definition of his species.

I am also retaining Grateloup's name *wagneri* for a somewhat smaller and more elongate race from the region of Lake Naujan, probably from one of the hills on the east coast of the lake. Most of the specimens that I am referring to *Cochlostyla mindoroensis wagneri* in our collection are labeled merely, if labeled at all, Lake Naujan. The largest series was obtained by the Menage Expedition of Worcester and Bourns. I am led to retain *wagneri* because a large series of specimens collected by Mr. de Mesa at Ariod, some little distance northwest of Lake Naujan, are larger and represent typical *Cochlostyla aspersa*. Some of the Worcester and Bourns collections labeled Naujan belong to this larger, more globose, and chubby race, although they are also labeled Lake Naujan. This makes me believe that they represent a different habitat from that occupied by *Cochlostyla aspersa wagneri*.

Mr. de Mesa has transmitted to us also a splendid series of specimens from Mount Sapol, which are referable to *Cochlostyla aspersa melanogaster* (Mörch), and has sent also a fine lot of a huge subspecies that I am calling *Cochlostyla (Chrysallis) aspersa lunai*, collected at Calamintao, on the west slope of Mount Halcon. This in some respects suggests *Cochlostyla (Chrysallis) rollei* but has always a dark tip and ranges with this species rather than with *rollei*.

Another race discovered by Pedro de Mesa I am calling *Cochlostyla (Chrysallis) aspersa juani*, which is the smallest of the races so far discovered and comes from Camorong, Municipality of Abra de Ilog, Mindoro.

In addition to these older forms, whose names I am salvaging, there are several additional recognizable races that are elongate-ovate in form with the base more protracted than in the other races. One of these was gathered by Colonel Mearns on the slopes of Mount Halcon. I have named this *Cochlostyla (Chrysallis) aspersa edgari*. Another, collected by Mr. de Mesa at Abra de Ilog, I have named *Cochlostyla (Chrysallis) aspersa ilogana*, and a third, also collected by Mr. de Mesa on Mount Calavite, I call *Cochlostyla (Chrysallis) aspersa calavitana*. Still another I am calling *Cochlostyla (Chrysallis) aspersa binuangana*, from Binuangan, Municipality of Paluan, north-west Mindoro.

The species may be defined as follows:

Shell varying in form from ovate to elongate-ovate. The base may be short and well rounded or protracted and less rounded. The nuclear whorls are always dark. There is usually between the nucleus and the last whorl a lighter turn or more, the last whorl being again darker than the preceding whorls. The shells are covered with a moderately thick periostracum, which may be mottled, streaked, fulgurated, spotted, and blotched with various shades of buff, yellow, or even orange. The base in some of the races is darker than the space between the summit and the periphery of the last whorl. The aperture varies from white to bluish white within, while the peristome ranges from pale chocolate to almost black with an azurite iridescence. The inner margin of the columella is usually white at its insertion, though in some instances this almost disappears. The nuclear whorls vary slightly in number, but they are never greatly removed from three turns. The first nuclear whorl is smooth, while the last shows the postnuclear sculpture, the intermediate elements being a gradation. The postnuclear whorls are moderately rounded, appressed at the summit, and almost smooth, being marked with somewhat irregular incremental lines and, in some of the races, indications of spiral striations. In addition the fine crisscross sculpture characteristic of most *Cochlostylas*, crossing the lines of growth obliquely, both protractively and retractively, is present here. The aperture varies from

broadly ovate to elongate-ovate. The peristome is broadly expanded and reflected and very wide at the insertion of the columella, where it is reflected over the umbilicus that it almost covers. The species apparently ranges all over the island and breaks up into the zoogeographic races discussed above.

The following key will help to differentiate the races:

KEY TO THE SUBSPECIES OF COCHLOSTYLA (CHRYSTALLIS) ASPERSA

Base of last whorl not protracted.

Shell ovate.

Shell large.

Lip almost black.....lunai

Lip not almost black.

Lip with a decidedly bluish tinge.....aspersa

Shell small.....juani

Shell not ovate.

Shell elongate-ovate.

Color of base conspicuously darker than the rest of the last whorl.

Shell gibbose.....mindoroensis

Shell not gibbose.

Shell slender.....melanogaster

Color of base not conspicuously darker than the rest of the last whorl.....

wagneri

Base of last whorl protracted.

Shell elongate-ovate.

Ground color of last whorl chocolate-brown.....edgari

Ground color of last whorl blackish brown.....binuangana

Shell not elongate-ovate.

Shell large.....ilogana

Shell small.....calavitana

COCHLOSTYLA (CHRYSTALLIS) ASPERSA LUNAI Bartsch

PLATE 112, FIGURE 7

1932. *Cochlostyla (Chrysallis) aspersa lunai* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 341.

1933. *Helicostyla (Chrysallis) mindoroensis* CLENCH and ARCHER, Papers Michigan Acad. Sci., Arts, Letters, vol. 17, p. 544; in part.

Shell large. The nuclear whorls are brown; all but the last post-nuclear whorl bright chestnut-brown; the last whorl almost blackish brown. The interior of the aperture bluish white, the expanded peristome and columella blackish brown. The postnuclear whorls are covered with a thin periostracum, showing retractively slanting hydrophanous bands, which are of varying shapes, sometimes regular zones, sometimes fulgurations, even in the same individual. These bands extend from the summit of the whorl to the umbilical chink. Nuclear whorls 3, the first well rounded and marked by lines of growth only, the succeeding turns marked by almost threadlike incremental

lines. These also show the hydrophanous marks referred to under the postnuclear sculpture. The postnuclear whorls are appressed at the summit, moderately well rounded, and marked by threadlike lines of growth, which vary much in strength and spacing, and also by numerous, closely spaced, fine, incised spiral lines and the usual criss-cross sculpture, which is present on both spire and base. The suture is moderately impressed. The periphery is obsoletely angulated. The base is comparatively short, inflated, and well rounded. The aperture is broadly oval. The outer lip is strongly expanded and reflected. The columella is also broadly expanded and reflected, forming a narrow umbilicus. The parietal wall is covered by a rather thick callus.

This subspecies is the largest of the *Cochlostyla* (*Chrysallis*) *aspersa* group. In size it suggests *Cochlostyla* (*Chrysallis*) *rollei*, from which it can at once be distinguished by its dark apex.

The type locality is on the west side of Mindoro.

The type (U.S.N.M. no. 313702), collected by Pedro de Mesa at Calamintao, Mamburao, Mindoro, has 5.5 whorls and measures: Length, 64.4 mm; greater diameter, 34.4 mm; lesser diameter, 31.6 mm.

Fourteen topotypes (U.S.N.M. no. 313649) from the same source yield the following measurements:

Number of whorls	Length	Greater diameter	Lesser diameter
	<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
5.4-----	67.5	36.5	32.3
5.7-----	57.2	31.0	27.5
6.1-----	65.1	32.6	29.5
5.3-----	70.2	38.3	33.2
5.9-----	57.8	30.7	27.3
5.1-----	55.4	30.1	27.3
5.9-----	56.2	30.0	28.4
5.9-----	71.4	35.4	29.3
5.5-----	64.5	33.3	30.7
4.9-----	58.6	34.4	29.8
6.0-----	62.6	33.0	28.6
5.8-----	63.7	34.8	29.0
5.7-----	62.2	32.5	30.8
5.5-----	60.1	34.6	30.0
5.6 ¹ -----	¹ 62.3	¹ 33.3	¹ 29.5
6.1 ² -----	² 71.4	² 38.3	² 33.2
4.9 ³ -----	³ 55.4	³ 30.0	³ 27.3

¹ Average.

Greatest.

³ Least.

COCHLOSTYLA (CHRYSALLIS) ASPERSA ASPERSA (Grateloup)

PLATE 112, FIGURES 1, 3

1840. *Bulimus aspersa* GRATELOUP, Actes Soc. Linn. Bordeaux, vol. 11, p. 164.

1840. *Bulimus aspersus* GRATELOUP, Mémoire sur plusieurs espèces de coquilles nouvelle ou peu connues de mollusques . . . , pp. 35-36, pl. 4, fig. 3.

1841. *Bulinus mindoroensis* BRODERIP, Proc. Zool. Soc. London, 1840, pp. 84-86; in part.
1842. *Bulinus mindoroensis* REEVE, Conchologia systematica . . . , vol. 2, p. 81, pl. 173, fig. 5.
1842. *Bulinus aspersus* PFEIFFER, Symbolae, vol. 2, p. 48.
1848. *Bulinus mindoroensis* PFEIFFER, Monographia heliceorum viventium, vol. 2, pp. 76-77; in part.
1851. *Bulinus mindoroensis* DESHAYES, Férussac's Histoire naturelle . . . mollusques . . . , vol. 2, pp. 15-16 (in part), pl. 149, figs. 1, 2.
1855. *Bulinus mindoroensis* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, ed. 2, vol. 1, Abt. 13, Theil 1, pp. 202-203; in part.
1856. *Bulinus aspersus* PFEIFFER, Malakozool. Blätter, vol. 2, p. 150.
1859. *Bulinus mindoroensis* PFEIFFER, Monographia heliceorum viventium, vol. 4, pp. 387-388; in part.
1860. *Chrysallis adpersa* MARTENS, Albers, Die Heliceen, ed. 2, p. 179.
1876. *Bulinus aspersus* PFEIFFER, Monographia heliceorum viventium, vol. 7, p. 49.
1877. *Cochlostyla aspersa* SEMPER, Reisen im Archipel der Philippinen, pt. 2, vol. 3, p. 222.
1892. *Cochlostyla mindoroensis* PILSBRY, Man. Conch., ser. 2, vol. 8, pp. 52-53 (in part), pl. 14, fig. 69.
1895. *Helicostyla mindoroensis* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 231; in part.
1896. *Chrysallis mindoroensis* ELERA, Catalogo sistematico de toda la fauna de Filipinas, vol. 3, pp. 611-612; in part.
1897. *Cochlostyla aspersa* HIDALGO, Journ. Conchyl., vol. 44, pp. 247, 248, 263.
1901. *Cochlostyla mindoroensis* HIDALGO, Obras malacologicas, pp. 548-550 (in part), pl. 97, fig. 3.
1914. *Cochlostyla mindoroensis* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 336-338; in part.
1932. *Cochlostyla (Chrysallis) aspersa aspersa* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 341.

Shell ovate. The nuclear whorls are dark chocolate-brown; the first postnuclear turn is buff; the rest are chocolate-brown, becoming darkest on the last part of the last turn. The postnuclear turns are covered with a moderately thick periostracum, which is blotched or streaked with buff or orange-buff, the base being darker than the posterior portion of the last whorl. The base is rather short, somewhat inflated, and strongly rounded. Aperture broadly oval. The peristome is expanded and reflected, particularly at the insertion of the columella, where it is reflected over the umbilicus, which it more than half covers. The parietal wall is covered by a rather thick callus.

This race differs from *Cochlostyla (Chrysallis) aspersa mindoroensis* in being more ovate, more inflated and chubby. It differs from *Cochlostyla (Chrysallis) aspersa lunai* in being in every way smaller.

The specimen described and figured (U.S.N.M. no. 313740a) is one collected by the Menage Expedition, as stated before, probably on the western shore of Lake Naujan. It seems to satisfy most closely the figure given of this species by Grateloup (see pl. 112,

COCHLOSTYLA (CHRYSTALLIS) ASPERSA MINDOROENSIS (Broderip)

PLATE 112, FIGURES 6, 8

1841. *Bulinus mindoroensis* BRODERIP, Proc. Zool. Soc. London, 1840, pp. 84-86; in part.
1842. *Bulinus mindoroensis* REEVE, Conchologia systematica . . . , vol. 2, pl. 57, figs. 4, 5.
1842. *Bulinus mindoroensis* PFEIFFER, Symbolae, vol. 2, p. 48.
1848. *Bulinus mindoroensis* PFEIFFER, Monographia heliceorum viventium, vol. 2, pp. 76-77; in part.
1849. *Bulinus mindoroensis* REEVE, Conchologia iconica, pl. 4, fig. 15.
1850. *Chrysallis mindoroensis* ALBERS, Die Heliceen, ed. 1, p. 141.
1851. *Bulinus mindoroensis* DESHAYES, Férussac's Histoire naturelle . . . mol-lusques . . . , vol. 2, pp. 15-16 (in part), pl. 149, figs. 6, 7.
1852. *Chrysallis mindoroensis* MÖRCH, Catalogus conchyliorum, quae reliquit Alphonso d'Aguirra y Gadea, Comes de Yoldi, vol. 1, p. 30.
1853. *Bulinus mindoroensis* PFEIFFER, Monographia heliceorum viventium, vol. 3, pp. 325-326; in part.
1855. *Bulinus mindoroensis* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, ed. 2, vol. 1, Abt. 13, Theil 1, pp. 202-203; in part.
1855. *Cochlostyla mindoroensis* H. and A. ADAMS, The genera of recent Mollusca, vol. 2, p. 143.
1856. *Bulinus mindoroensis* PFEIFFER, Malakozool. Blätter, vol. 2, p. 150.
1859. *Bulinus mindoroensis* PFEIFFER, Monographia heliceorum viventium, vol. 4, pp. 387-388; in part.
1860. *Chrysallis mindoroensis* MARTENS, Albers, Die Heliceen, ed. 2, p. 179.
1868. *Bulinus mindoroensis* PFEIFFER, Monographia heliceorum viventium, vol. 6, p. 34; in part.
1876. *Bulinus mindoroensis* PFEIFFER, Monographia heliceorum viventium, vol. 7, p. 49; in part.
1877. *Cochlostyla mindoroensis* SEMPER, Reisen im Archipel der Philippinen, pt. 2, vol. 3, p. 222.
1887. *Cochlostyla mindoroensis* HIDALGO, Journ. Conchyl., vol. 35, pp. 173-174; in part.
1892. *Cochlostyla mindoroensis* PILSBRY, Man. Conch., ser. 2, vol. 8, pp. 52-53 (in part), pl. 14, fig. 71.
1895. *Helicostyla mindoroensis* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 231; in part.
1896. *Chrysallis mindoroensis* ELERA, Catalogo sistematico de toda la fauna de Filipinas, vol. 3, pp. 611-612; in part.
1897. *Cochlostyla mindoroensis* HIDALGO, Journ. Conchyl., vol. 44, pp. 247, 248, 263, 296, 298, 325, 331, 341, 350, 352.
1898. *Cochlostyla mindoroensis* MÖLLENDORFF, Abh. Naturf. Ges. Göttingen, vol. 22, p. 146; in part.
1901. *Cochlostyla mindoroensis* HIDALGO, Obras malacologicas, pp. 548-550 (in part), pl. 97, fig. 4.
1914. *Cochlostyla mindoroensis* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 336-338 (in part), pl. 175, figs. 4-6.
1932. *Cochlostyla (Chrysallis) aspersa mindoroensis* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 342.

Shell elongate-ovate. The nuclear whorls and the first half of the postnuclear turns are chocolate-brown; the succeeding turn is pale

chestnut-brown; the last whorl chestnut-brown. The shell is covered with a moderately thick periostracum, which is streaked, banded, and sometimes fulgurated with retractively slanting axial streaks of buff or orange-buff, alternating with brown and almost blackish-brown bands, the darkest coloration always being on the last whorl and the base of the last whorl being always darker than the posterior portion of it. The aperture is decidedly bluish within, this coloration extending to the inner edge of the periostracum, the outer expanded peristome being dark, almost black, with an azurite reflection. The inner edge of the columella is like the interior of the aperture, possibly a trifle darker, while the outer portion continues the color of the peristome. Nuclear whorls 3; the first smooth and the rest marked like the postnuclear turns, the space between grading into these sculptures. The postnuclear whorls are appressed at the summit, moderately well rounded, and marked by retractively slanting lines of growth, which are somewhat irregular in width and spacing. In addition the whorls are marked by the characteristic criss-cross sculpture described for the species, which is present on base and spire. The aperture is broadly oval; peristome is broadly expanded and reflected, particularly so at the insertion of the columella where it almost covers the umbilicus, leaving only a very narrow chink. The parietal wall is covered by a moderately thick callus.

This subspecies is most nearly related to the typical form but is slenderer.

Number of whorls	Length	Greater diameter	Lesser diameter
	<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
6.0	58.4	29.1	23.9
6.0	63.3	33.1	27.6
5.9	54.1	29.6	24.9
6.1	55.1	26.7	22.6
6.1	59.3	29.0	24.5
5.5	49.6	27.8	24.6
6.0	54.1	28.1	24.7
5.5	55.4	31.1	26.6
5.6	57.5	27.8	23.1
6.0	56.8	30.8	26.3
5.8	60.8	32.8	28.0
5.5	49.0	28.0	23.7
5.5	56.8	32.3	26.8
5.6	54.9	27.3	23.7
5.8	60.4	33.2	28.1
5.6	60.9	31.6	26.0
5.7	52.8	30.1	26.0
5.9	59.7	29.5	26.3
5.78 ¹	¹ 56.6	¹ 29.88	¹ 25.4
6.0 ²	² 63.3	² 33.2	² 28.1
5.5 ³	³ 49.0	³ 26.7	³ 22.6

¹ Average.² Greatest.³ Least.

The specimen described and figured well represents the form depicted by Reeve. I am adding a copy of Reeve's illustration (see figure 15, *Conchologia Iconica*) for comparison. This specimen was collected by von Möllendorff and bears only the label "Mindoro." It has 6 whorls and measures: Length, 63.3 mm; greater diameter, 32.4 mm; lesser diameter, 28.5 mm.

It probably came from the region of Puerto Galera.

Eighteen specimens (U.S.N.M. no. 313705) received from Pedro de Mesa were collected by him at Dulangan, Puerto Galera, and yield the measurements given in the foregoing table.

COCHLOSTYLA (CHRYSTALLIS) ASPERSA MELANOGASTER (Mösch)

PLATE 112, FIGURE 4

1841. *Bulinus mindoroensis* BRODERIP, Proc. Zool. Soc. London, 1840, pp. 84-86; in part.
1851. *Bulimus mindoroensis* DESHAYES, Férussac's Histoire naturelle . . . mollusques . . ., vol. 2, pp. 15-16 (in part), p. 149, fig. 9(?).
1852. *Chrysallis melanogaster* MÖRCH, Catalogus conchyliorum, quae reliquit Alphonso d'Aguirra y Gadea, Comes de Yoldi, vol. 1, p. 30.
1853. *Bulimus mindoroensis* PFEIFFER, Monographia heliceorum viventium, vol. 3, pp. 325-326; in part.
1855. *Bulimus mindoroensis* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, ed. 2, vol. 1, Abt. 13, Theil 1, pp. 202-203 (in part), pl. 57, figs. 4, 5.
1859. *Bulimus mindoroensis* PFEIFFER, Monographia heliceorum viventium, vol. 4, pp. 387-388; in part.
1868. *Bulimus mindoroensis* PFEIFFER, Monographia heliceorum viventium, vol. 6, p. 34; in part.
1876. *Bulimus mindoroensis* PFEIFFER, Monographia heliceorum viventium, vol. 7, p. 49; in part.
1892. *Cochlostyla mindoroensis* PILSBRY, Man. Conch., ser. 2, vol. 8, pp. 52-53 (in part), pl. 14, fig. 68.
1895. *Helicostyla mindoroensis* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 231; in part.
1896. *Chrysallis mindoroensis* ELERA, Catalogo sistematico de toda la fauna de Filipinas, vol. 3, pp. 611-612; in part.
1897. *Cochlostyla melanogaster* HIDALGO, Journ. Conchyl., vol. 44, pp. 296, 298.
1898. *Cochlostyla mindoroensis* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 146; in part.
1901. *Cochlostyla mindoroensis* HIDALGO, Obras malacologicas, pp. 548-550; in part.
1914. *Cochlostyla mindoroensis melanogaster* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 336-338; in part.
1932. *Cochlostyla (Chrysallis) aspersa melanogaster* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 342.
1933. *Helicostyla (Chrysallis) mindoroensis* CLENCH and ARCHER, Papers Michigan Acad. Sci., Arts, Letters, vol. 17, p. 544; in part.

Shell rather small, slender, elongate-ovate. The nuclear whorls are dark chocolate-brown, the succeeding turn bright chestnut-brown, the last whorl blackish brown. A moderately strong periostracum

covers the surface of the shell, and this is streaked with retractively slanting streaks, blotches, spots, and sometimes fulgurations of buff or orange-buff. The base of the last whorl is always darker than the posterior half of the turn. The aperture is white with a bluish tint within. The peristome is very dark brown, almost black, with a bluish reflection, the inner edge of the columella, particularly at its insertion, tending to the same color as that of the aperture. The parietal wall is covered by a dark callus. Nuclear whorls almost 3; the first smooth, the rest gradually acquiring the sculpture of the postnuclear turns. The postnuclear whorls are moderately rounded, appressed at the summit, and marked by retractively slanting lines of growth and obsolete spiral striations and also by rather coarse microscopic crisscross sculpture. The aperture is broadly oval; the peristome is very broadly expanded and reflected.

Number of whorls	Length	Greater diameter	Lesser diameter
	<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
5.6-----	51.3	25.8	21.8
5.7-----	54.4	27.8	22.5
5.6-----	48.2	27.8	23.1
5.6-----	48.6	27.3	22.4
5.6-----	52.3	27.7	23.7
5.7-----	50.6	27.4	22.7
5.7-----	51.1	27.3	22.6
5.8-----	48.3	26.4	22.2
5.8-----	48.0	27.8	22.4
5.8-----	53.7	26.5	22.0
5.6-----	51.7	29.4	24.4
5.8-----	51.9	28.4	23.4
5.7-----	52.3	30.0	24.3
5.6-----	49.4	25.9	21.8
5.9-----	53.8	28.3	23.4
5.6-----	47.3	26.0	21.6
5.8-----	50.3	25.6	21.4
5.7-----	50.8	28.0	23.1
5.8-----	51.3	26.7	22.7
5.8-----	49.4	27.8	23.9
5.6-----	46.7	26.8	22.8
5.2-----	54.5	27.0	23.3
5.0-----	49.1	26.3	22.4
5.0-----	48.8	26.6	23.5
5.0-----	54.0	27.5	24.2
5.2-----	50.8	27.5	24.1
4.7-----	51.8	27.4	24.2
5.0-----	48.3	25.5	22.4
5.5-----	54.5	25.3	23.1
4.5-----	46.0	26.1	22.5
5.0-----	52.8	26.4	22.5
5.0-----	53.7	27.8	24.1
4.9-----	45.2	25.7	22.7
5.2-----	54.3	26.8	22.8
5.4 ¹ -----	¹ 50.74	¹ 27.07	¹ 22.94
5.9 ² -----	² 54.5	² 30.0	² 24.4
4.5 ³ -----	³ 45.2	³ 25.3	³ 21.4

¹ Average. ² Greatest. ³ Least.

The specimen described and figured (U.S.N.M. no. 313657a) was collected by Pedro de Mesa on Mount Sapol near Calapan, Mindoro. It has 5.8 whorls and measures: Length, 49.3 mm; greater diameter, 26 mm; lesser diameter, 22.1 mm. This corresponds well with Pfeiffer's figures 4 and 5 of plate 57, Martini-Chemnitz, which Mörch took as the basis for his name and which I am reproducing here.

An additional series of specimens (U.S.N.M. no. 313657), from the same source, yields the data given in the foregoing table.

COCHLOSTYLA (CHRYSTALLIS) ASPERSA WAGNERI (Grateloup)

PLATE 113, FIGURES 4, 7

1840. *Bulinus wagneri* GRATELOUP, Actes Soc. Linn. Bordeaux, vol. 11, p. 164.
1840. *Bulinus aspersus* var. *wagneri* GRATELOUP, Mémoire sur plusieurs espèces de coquilles nouvelles ou peu connues de mollusques . . . , p. 35, pl. 2, fig. 8.
1841. *Bulinus mindoroensis* BRODERIP, Proc. Zool. Soc. London, 1840, pp. 84-86; in part.
1842. *Bulinus mindoroensis* PFEIFFER, Symbolae, vol. 2, p. 48.
1848. *Bulinus mindoroensis* PFEIFFER, Monographia heliceorum viventium, vol. 2, pp. 76-77; in part.
1852. *Chrysallis wagneri* MÖRCH, Catalogus conchyliorum, quae reliquit Alphonso d'Aguirra y Gadea, Comes de Yoldi, vol. 1, p. 30.
1853. *Bulinus mindoroensis* PFEIFFER, Monographia heliceorum viventium, vol. 3, pp. 325-326; in part.
1859. *Bulinus mindoroensis* PFEIFFER, Monographia heliceorum viventium, vol. 4, pp. 387-388; in part.
1868. *Bulinus mindoroensis* PFEIFFER, Monographia heliceorum viventium, vol. 6, p. 34; in part.
1876. *Bulinus mindoroensis* PFEIFFER, Monographia heliceorum viventium, vol. 7, p. 49; in part.
1887. *Cochlostyla mindoroensis* HIDALGO, Journ. Conchyl., vol. 35, p. 174; in part.
1892. *Cochlostyla mindoroensis* PILSBRY, Man. Conch., ser. 2, vol. 8, pp. 52-53; in part.
1895. *Helicostyla mindoroensis* PILSBRY, Man. Conch., ser. 2, vol. 9, p. 231; in part.
1896. *Chrysallis mindoroensis* ELERA, Catalogo sistematico de toda la fauna de Filipinas, vol. 3, pp. 611-612; in part.
1897. *Cochlostyla wagneri* HIDALGO, Journ. Conchyl., vol. 44, pp. 248, 298, 325.
1898. *Cochlostyla mindoroensis* MÖLLENDORFF, Abh. Naturf. Ges. Görlitz, vol. 22, p. 146; in part.
1901. *Cochlostyla mindoroensis* HIDALGO, Obras malacologicas, pp. 548-550; in part.
1914. *Cochlostyla mindoroensis* MÖLLENDORFF, KOBELT, and WINTER, Semper's Reisen im Archipel der Philippinen, vol. 10, pp. 336-338; in part.
1932. *Cochlostyla (Chrysallis) aspersa wagneri* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 342.

Shell elongate-ovate. The base of the last whorl is rather short and well rounded. The early whorls are dull bluish chocolate-brown, the middle one buff with a brownish tint and the last one chestnut-brown. The postnuclear whorls are marked by retractively slanting bands, blotches, spots, or fulgurations of yellowish buff, which extend over

1902, 1903 and 1904. The basal portion of the bed which is chiefly dolomite, has the same position in it. The nature of the exposure is quite typical, the bedding is perfectly horizontal, and the surface of the rock is a very smooth, and even, surface, and is very much like the surface of the rock. There is a small fault which crosses the bed in the lower part of the exposure at the base of the bed. The fault which is the first well marked, however, the bed is crossed by horizontal fractures, which probably develop into the present bed of the rock. The present bed which is exposed in the lower part, is chiefly dolomite, and is marked by very fine, vertical, and horizontal lines of growth, which are quite regular, and the bed is very much like the bed of the rock. The exposure is very typical. The exposure is chiefly exposed and is very much like the bed of the rock. In the lower part, a small fault crosses the bed. The present bed is crossed by a small fault which crosses

Number of beds	Length	Thickness	Layer
1.0	1.0	1.0	1.0
1.1	1.1	1.1	1.1
1.2	1.2	1.2	1.2
1.3	1.3	1.3	1.3
1.4	1.4	1.4	1.4
1.5	1.5	1.5	1.5
1.6	1.6	1.6	1.6
1.7	1.7	1.7	1.7
1.8	1.8	1.8	1.8
1.9	1.9	1.9	1.9
2.0	2.0	2.0	2.0
2.1	2.1	2.1	2.1
2.2	2.2	2.2	2.2
2.3	2.3	2.3	2.3
2.4	2.4	2.4	2.4
2.5	2.5	2.5	2.5
2.6	2.6	2.6	2.6
2.7	2.7	2.7	2.7
2.8	2.8	2.8	2.8
2.9	2.9	2.9	2.9
3.0	3.0	3.0	3.0
3.1	3.1	3.1	3.1
3.2	3.2	3.2	3.2
3.3	3.3	3.3	3.3
3.4	3.4	3.4	3.4
3.5	3.5	3.5	3.5
3.6	3.6	3.6	3.6
3.7	3.7	3.7	3.7
3.8	3.8	3.8	3.8
3.9	3.9	3.9	3.9
4.0	4.0	4.0	4.0
4.1	4.1	4.1	4.1
4.2	4.2	4.2	4.2
4.3	4.3	4.3	4.3
4.4	4.4	4.4	4.4
4.5	4.5	4.5	4.5
4.6	4.6	4.6	4.6
4.7	4.7	4.7	4.7
4.8	4.8	4.8	4.8
4.9	4.9	4.9	4.9
5.0	5.0	5.0	5.0
5.1	5.1	5.1	5.1
5.2	5.2	5.2	5.2
5.3	5.3	5.3	5.3
5.4	5.4	5.4	5.4
5.5	5.5	5.5	5.5
5.6	5.6	5.6	5.6
5.7	5.7	5.7	5.7
5.8	5.8	5.8	5.8
5.9	5.9	5.9	5.9
6.0	6.0	6.0	6.0
6.1	6.1	6.1	6.1
6.2	6.2	6.2	6.2
6.3	6.3	6.3	6.3
6.4	6.4	6.4	6.4
6.5	6.5	6.5	6.5
6.6	6.6	6.6	6.6
6.7	6.7	6.7	6.7
6.8	6.8	6.8	6.8
6.9	6.9	6.9	6.9
7.0	7.0	7.0	7.0
7.1	7.1	7.1	7.1
7.2	7.2	7.2	7.2
7.3	7.3	7.3	7.3
7.4	7.4	7.4	7.4
7.5	7.5	7.5	7.5
7.6	7.6	7.6	7.6
7.7	7.7	7.7	7.7
7.8	7.8	7.8	7.8
7.9	7.9	7.9	7.9
8.0	8.0	8.0	8.0
8.1	8.1	8.1	8.1
8.2	8.2	8.2	8.2
8.3	8.3	8.3	8.3
8.4	8.4	8.4	8.4
8.5	8.5	8.5	8.5
8.6	8.6	8.6	8.6
8.7	8.7	8.7	8.7
8.8	8.8	8.8	8.8
8.9	8.9	8.9	8.9
9.0	9.0	9.0	9.0
9.1	9.1	9.1	9.1
9.2	9.2	9.2	9.2
9.3	9.3	9.3	9.3
9.4	9.4	9.4	9.4
9.5	9.5	9.5	9.5
9.6	9.6	9.6	9.6
9.7	9.7	9.7	9.7
9.8	9.8	9.8	9.8
9.9	9.9	9.9	9.9
10.0	10.0	10.0	10.0

Grateloup's figure shows a badly worn and decorticated specimen, which I can match with some material from the Lake Naujan region. The race about this lake has the short, rounded base and is smaller than typical *aspersa* to the north of this region. I am, therefore, reserving Grateloup's name for this race.

Thirty specimens (U.S.N.M. no. 313711), collected by Worcester and Bourns on the Menage Expedition about Lake Naujan, yield the data given in the foregoing table.

The specimen described and figured (U.S.N.M. no. 313710) was collected by Worcester and Bourns on the Menage Expedition. It has 5.9 whorls and measures: Length, 59.9 mm; greater diameter, 30 mm; lesser diameter, 24.5 mm.

COCHLOSTYLA (CHRYSTALLIS) ASPERSA EDGARI Bartsch

PLATE 113, FIGURE 6

1932. *Cochlostyla (Chrysallis) aspersa edgari* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 342.

Shell elongate-ovate. The base of the last whorl is considerably protracted and gently rounded. Early whorls are chocolate-brown with a purplish tinge; the middle whorl is buff, and the last chestnut-brown. The whorls are marked by retractively slanting bands of yellowish buff, which may be fulgurated, broken, or more or less complete, though alternating with zones of the ground color of the shell. Interior of the aperture pale bluish; peristome with a chocolate-brown outer edge, the inner portion of the peristome fading into the color of the aperture, both on the outer lip and the columella. Nuclear whorls 3, the first smooth, the rest grading into the sculpture of the post-nuclear whorls, which consists of irregular, retractively curved, incremental lines. The usual crisscross microscopic sculpture is well pronounced on both spire and base. The postnuclear whorls are appressed at the summit and moderately well rounded. The periphery is also rounded and the protracted base gently so. Aperture broadly oval; outer lip broadly expanded and reflected, the inner lip likewise expanded and reflected, particularly at its insertion, where it almost covers the umbilicus. The parietal wall is covered by a rather stout callus.

The type (U.S.N.M. no. 313712) was collected by Col. Edgar A. Mearns on the Mount Halcon Expedition. It has 6 whorls and measures: Length, 66.2 mm, greater diameter, 32 mm; lesser diameter, 28.2 mm.

Eight topotypes (U.S.N.M. no. 255799) yield the following additional measurements:

Number of whorls	Length	Greater diameter	Lesser diameter
	<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
6. 1-----	63. 0	31. 1	26. 5
6. 5-----	63. 6	30. 0	25. 9
5. 6-----	60. 9	30. 3	25. 9
6. 1-----	64. 4	31. 4	27. 7
5. 8-----	63. 2	32. 8	27. 8
6. 1-----	60. 1	29. 8	25. 3
6. 3-----	61. 9	31. 2	26. 8
6. 3-----	59. 2	30. 0	26. 0

Another specimen in our collection (U.S.N.M. no. 255798) is labeled "Mindoro of Luzun", also collected by Colonel Mearns, a locality that I have been unable to locate, but also on Mount Halcon. This specimen has 6.3 whorls and measures: Length, 62 mm; greater diameter, 31.5 mm.

Another specimen without specific locality comes from the Cuming collection. This is the largest of the races belonging to the group with the protracted base.

COCHLOSTYLA (CHRYSTALLIS) ASPERSA BINUANGANA Bartsch

PLATE 112, FIGURE 5

1932. *Cochlostyla (Chrysallis) aspersa binuangana* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 342.
 1933. *Helicostyla (Chrysallis) mindoroensis furva* CLENCH and ARCHER, Papers Michigan Acad. Sci., Arts, Letters, vol. 17, p. 546, pl. 58, fig. 3.

Shell elongate-ovate; the first postnuclear whorls are smoky buff, the remaining chocolate-color, the last turn being blackish chocolate-brown. The interior of the aperture is pale blue; the peristome and outer edge of the columella are blackish brown. The inner edge of the columella is pale blue. The entire shell, except the first nuclear whorl, is covered by a thin periostracum, crossed by hydrophanous buff-colored bands, which cover the last whorl for the major part. These hydrophanous markings are very irregular, sometimes almost axial, sometimes fulgurated, sometimes blotched and spotted, and they extend over both spire and base. There is an indication of a dislocation of the bands at the periphery of the last turn. Nuclear whorls 2.8; the first smooth, the next marked by incremental lines, which on the last turn assume almost the strength of threads. The postnuclear whorls are well rounded, appressed at the summit, and marked by irregular threadlike incremental lines, which are retractorily slanting. The whorls are also marked by microscopic, closely spaced, spiral striations, and the usual crisscross sculpture. The periphery is obsoletely angulated. The base is rather long, somewhat inflated, well rounded. The aperture is broadly oval; the outer

lip is expanded and reflected. The columella is rather narrow, also reflected, forming a narrow umbilicus. The parietal wall is covered by a moderately thick callus.

The type (U.S.N.M. no. 313713), collected by Pedro de Mesa at Binuangan, Principality of Paluan, Mindoro, has 6 whorls and measures: Length, 49 mm; greater diameter, 26 mm; lesser diameter, 22 mm.

A series of topotypes, also collected by Mr. de Mesa, yields the following data:

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
313647	6.3	51.7	26.5	22.7
313647	6.0	47.7	25.5	21.7
313647	6.1	46.2	23.7	21.0
313647	6.0	49.4	27.9	22.9
313647	6.1	48.8	24.8	22.1
313647	6.1	48.7	26.1	22.2
313647	6.1	51.4	26.0	22.3
313647	6.2	50.0	25.1	21.5
313647	6.0	47.4	22.7	20.6
313647	6.2	49.5	25.5	21.8
313647	6.2	49.6	28.3	22.6
313647	6.1	48.6	26.4	22.3
313647	6.1	50.5	25.7	21.4
313647	5.8	42.1	23.3	21.1
313647	6.0	47.5	25.5	22.0
313647	6.2	50.8	25.8	22.0
313647	6.5	52.0	25.5	21.5
313647	6.6	57.5	26.2	21.4
313647	6.5	56.0	26.8	22.9
313647	6.5	54.8	25.8	21.4
313647	6.4	57.3	25.9	22.2
313647	6.1	50.0	28.2	23.7
313647	6.2	50.5	26.1	21.9
313647	5.9	45.0	24.2	21.4
313647	5.9	44.9	23.3	20.2
313654	6.1	50.1	28.3	23.5
313654	5.9	48.7	24.5	21.1
313654	6.2	52.8	26.0	22.1
313654	6.0	50.5	27.1	23.7
313654	6.2	53.0	28.4	23.5
313654	6.1	53.9	29.4	24.2
313654	6.0	50.5	24.4	21.4
313654	6.2	52.8	28.5	22.7
313654	6.0	48.9	24.5	21.0
313654	6.3	51.4	27.8	23.2
313654	6.3	52.6	25.1	21.5
313654	6.0	49.5	25.8	21.5
313654	6.0	47.0	25.4	21.9
Average	6.14	50.2	25.92	22.05
Greatest	6.6	57.5	29.4	24.2
Least	5.8	42.1	22.7	20.2

U.S.N.M. no. 313648 contains six specimens from Pula, Principality of Paluan, Mindoro, which I am provisionally referring here, also collected by Mr. de Mesa.

This is a very dark-colored ovate form, which suggests *Cochlostyla* (*Chrysallis*) *aspersa melanogaster* but lacks the dark basal coloration.

COCHLOSTYLA (CHRYSTALLIS) ASPERSA ILOGANA Bartsch

PLATE 113, FIGURE 8

1932. *Cochlostyla* (*Chrysallis*) *aspersa ilogana* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 342.

1933. *Helicostyla* (*Chrysallis*) *mindoroensis parallaxis* CLENCH and ARCHER, Papers Michigan Acad. Sci., Arts, Letters, vol. 17, p. 550; in part.

Shell very elongate and regularly ovate, all but the last whorl pale chestnut-brown, that one very dark brown, almost black. The shell is covered with a rather strong periostracum, which is axially re-tractively streaked with zones of dull buff, these zones varying materially in width and permitting the ground color of the shell to appear in the interspaces. The light zones are not at all regular but vary from straight bands to fulgurations. The base is usually slightly darker than the posterior half of the last whorl, and here the bands frequently assume an orange-buff tinge. The aperture is pale blue within; the broadly expanded peristome is almost black. There is a bluish triangle at the inner edge of the insertion of the columella. Nuclear whorls 2.8, the first smooth, the rest gradually assuming the postnuclear sculpture. The postnuclear whorls are slightly shouldered at the summit, almost flattened, the last one is feebly angulated at the periphery and has the base strongly protracted. They are marked by retractively curved, almost flattened, threadlike lines of growth, which extend on the last whorl to the umbilical chink. In addition they are marked by obsolete spiral striations and the usual crisscross microscopic sculpture. The aperture is elongate-oval; the peristome is broadly expanded and reflected, that of the inner lip almost covering the umbilicus. The parietal wall is covered by a rather strong callus.

The type (U.S.N.M. no. 313706) was collected by Pedro de Mesa at Camorong, Abra de Ilog, Mindoro. It has 6.8 whorls and measures: Length, 66.3 mm; greater diameter, 31.7 mm; lesser diameter, 25.6 mm.

Thirty-eight topotypes (U.S.N.M. nos. 313707, 313659, and 313662) yield the additional information shown on the following page.

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
		<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
313707-----	6.7	64.8	32.5	26.8
313707-----	6.7	63.7	33.4	28.2
313707-----	6.6	60.2	29.3	26.2
313707-----	6.4	60.1	29.3	25.6
313707-----	6.4	58.9	31.3	26.5
313707-----	6.6	58.3	30.3	24.5
313707-----	6.0	59.9	29.3	25.3
313707-----	6.4	60.3	32.4	26.9
313707-----	6.7	66.1	31.2	25.9
313707-----	6.2	48.1	24.9	21.8
313707-----	6.4	55.3	26.3	23.0
313707-----	6.4	58.0	28.3	23.9
313707-----	6.2	51.0	26.8	22.2
313707-----	6.7	54.6	24.9	21.9
313707-----	6.5	53.3	26.1	21.5
313707-----	6.1	59.2	28.6	23.5
313707-----	6.0	53.9	30.0	24.8
313707-----	5.9	52.9	27.1	22.3
313707-----	6.6	55.8	28.2	22.3
313659-----	6.9	59.2	26.3	22.5
313659-----	6.8	61.1	29.7	24.9
313659-----	7.0	58.0	25.1	21.7
313659-----	6.6	58.1	28.1	23.9
313659-----	6.9	55.2	26.2	22.7
313659-----	6.9	56.2	26.3	22.7
313659-----	6.3	55.3	28.3	24.3
313659-----	6.9	60.8	28.7	24.9
313659-----	6.5	53.1	30.2	24.6
313659-----	7.0	67.7	28.7	24.8
313662-----	6.9	59.0	26.3	23.3
313662-----	6.9	60.6	27.9	24.6
313662-----	6.5	57.6	26.2	24.0
313662-----	6.4	57.0	27.3	23.6
313662-----	7.1	58.3	27.2	23.2
313662-----	6.1	52.0	29.7	25.4
313662-----	6.9	59.2	27.5	23.3
313662-----	6.8	58.3	27.6	23.8
313662-----	6.5	60.9	30.8	26.0
Average-----	6.56	57.94	28.39	24.1
Greatest-----	7.1	67.7	33.4	28.2
Least-----	5.9	48.1	24.9	21.5

This subspecies can readily be distinguished from *Cochlostyla* (*Chrysallis*) *aspersa edgari* by its much more regularly elongate-ovate form and from *Cochlostyla* (*Chrysallis*) *aspera calavitana* by its much greater size.

COCHLOSTYLA (CHRYSTALLIS) ASPERSA CALAVITANA Bartsch

PLATE 113, FIGURE 5

1932. *Cochlostyla* (*Chrysallis*) *aspersa calavitana* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 342.
1933. *Helicostyla* (*Chrysallis*) *mindoroensis parallaxis* CLENCH and ARCHER, Papers Michigan Acad. Sci., Arts, Letters, vol. 17, p. 550, pl. 58, fig. 2; in part.

Shell small, elongate-ovate, rather dull in coloration, all but the last whorl very pale brown or buffish brown, the last whorl chestnut-brown. All except the early nuclear whorls are variegated with retractively curved, axial streaks of dull buff. These streaks vary considerably in width and distribution on the various turns and also in their form, each ranging from broad bands to fulgurations. The base is slightly darker than the posterior part of the last whorl. The interior of the aperture is pale blue, which color extends also over the inner portion of the peristome; the outer edge of the peristome is almost black. The inner edge of the columella is also blue like the interior of the aperture. Nuclear whorls 3, the first smooth, the rest gradually assuming the postnuclear sculpture, which consists of low, irregular, rather closely approximated, retractively curved incremental lines. In addition the postnuclear whorls are marked by the usual crisscross microscopic sculpture and indications of obsolete spiral striations. The postnuclear whorls are slightly rounded and appressed at the summit. There is a feeble angle at the periphery and the basal portion of the last turn is considerably protracted. The aperture is elongate-ovate; the peristome is broadly expanded and reflected. The reflection almost covers the umbilicus at the insertion of the columella. The parietal wall is covered by a moderately thick callus.

This race can at once be distinguished from the other members with the protracted base by its exceedingly small size.

The type (U.S.N.M. no. 313714) was collected by Pedro de Mesa on Mount Calavite near Paluan, Mindoro. It has 6.5 whorls and measures: Length, 55 mm; greater diameter, 26.8 mm; lesser diameter, 22.6 mm.

Five topotypes (U.S.N.M. no. 313715) from the same source yield the following measurements:

Number of whorls	Length	Greater diameter	Lesser diameter
	<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
6.3.....	51. 7	25. 9	21. 9
6.4.....	53. 3	25. 0	20. 7
6.3.....	52. 7	24. 2	20. 0
6.2.....	50. 7	23. 2	20. 2
6.5.....	54. 8	26. 5	21. 8

COCHLOSTYLA (CHRYSTALLIS) CANICEPS Bartsch

1932. *Cochlostyla (Chrysalis) caniceps* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 342.

Shell varying from elongate-ovate to elongate-conic in the different races. The nuclear whorls and probably the first postnuclear whorls in all of the races are flesh-color, sometimes soiled flesh-color. The last nuclear whorl and the light postnuclear whorls are bordered with a

narrow zone of brown at the summit. The postnuclear whorls vary from almost flattened to fairly well rounded, and the periphery of the last whorl in some of the races is quite inflated; in others it is not inflated, but in all of them it is rounded and usually marked with a color line that separates the basal portion of the shell from the posterior part. The base, too, in some of the races is more inflated than in others. The postnuclear whorls are marked by retractorily slanting bands or fulgurations of yellow or greenish yellow, which vary in width and strength and emphasis. These extend from the summit to the umbilical region. In some of the races on the last whorl they become more or less fused, and here the shell looks as if it were covered with a uniform motley periostracum. The interior of the aperture is bluish white, and the expanded peristome varies from white suffused with purplish brown to purplish brown in the different races. In all of them the outer edge of the peristome is bounded by a zone of purplish brown. This usually also extends up on the outer edge of the parietal callus. The postnuclear whorls are marked by retractorily slanting, irregularly developed and spaced lines of growth, which give to the surface of the shell a somewhat rough appearance. The shaggy appearance obscures the fine microscopic crisscross sculpture, which crosses the lines of growth obliquely. The aperture is broadly oval; the outer lip is broadly expanded and reflected; the inner lip very broad at its insertion where it is reflected over the umbilicus, which it almost covers. The parietal area is covered by a rather thick callus.

This species seems to be widely distributed on the island of Mindoro. It probably ranges over the entire island and apparently breaks up into a number of races, so I give it a specific status here.

KEY TO THE SUBSPECIES OF COCHLOSTYLA (CHRYSTALLIS) CANICEPS

Shell brilliantly variegated.....	demesai
Shell not brilliantly variegated.	
Shell rather dull in color.	
Shell elongate-ovate.	
Shell large; length more than 70 mm.....	maita
Shell not large; length less than 65 mm.....	contracostana
Shell elongate-conic.	
Whorls almost flattened.....	conica
Whorls rounded.	
Length more than 55 mm.....	caniceps
Length less than 50 mm.....	minuta

COCHLOSTYLA (CHRYSTALLIS) CANICEPS DEMESAI Bartsch

PLATE 114, FIGURE 1

1932. *Cochlostyla (Chrystallis) caniceps demesai* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 342.
1933. *Helicostyla (Chrystallis) mindoroensis electrica* CLENCH and ARCHER, Papers Michigan Acad. Sci., Arts, Letters, vol. 17, p. 545; in part.

Shell elongate-ovate. The nuclear whorls are flesh-color. The early postnuclear whorls are pale brown, gradually turning to almost blackish brown on the last turn. On the early whorls a darkish zone is present also at the summit of the turns. Over this ground color more or less zigzag, retractively slanting, sometimes fulgurated lines of greenish buff are placed. These color markings extend from the summit to the umbilical chink. The aperture is bluish white within. The expanded peristome and a slight portion of the outer edge of the columella are smoky chocolate-brown, the dark color extending much farther within the aperture than in the other races. Nuclear whorls 3, well rounded. The last one is marked by a similar type of sculpture as that which characterizes the postnuclear turns. The postnuclear whorls are very narrowly shouldered at the summit and crossed by retractively curved lines of growth, which vary very much in strength, and also in spacing, but they are rather closely crowded. In addition the whorls are marked by the fine microscopic crisscross sculpture characteristic of the group. Aperture broadly oval. The peristome decidedly expanded and reflected. The inner lip is also expanded and reflected, rather decidedly so at its insertion where its reflection almost covers the umbilicus, leaving only a chink. The parietal wall is covered by a rather thick callus.

This race can at once be distinguished from the other subspecies by the fact that the color is much darker than in any of the others, the dark color on the peristome extending within the aperture, a feature not observed in any of the other forms of this species.

The type (U.S.N.M. no. 313552) was collected by Pedro de Mesa at Calamintao, Mamborao, Mindoro, which is southwest of Mount Halcon. The type has 6.8 whorls and measures: Length, 65 mm; greater diameter, 34.8 mm; lesser diameter, 27.8 mm.

Thirteen topotypes (U.S.N.M. nos. 313553 and 313651) measure:

U.S.N.M. no.	Number of whorls	Length	Greater diameter	Lesser diameter
313553.....	6. 9	<i>Mm</i> 66. 5	<i>Mm</i> 38. 2	<i>Mm</i> 30. 8
313553.....	6. 9	67. 3	35. 0	27. 7
313553.....	6. 3	56. 8	30. 0	24. 8
313651.....	6. 7	66. 9	35. 8	28. 3
313651.....	6. 3	59. 5	32. 2	27. 7
313651.....	6. 4	60. 2	33. 3	27. 0
313651.....	6. 5	62. 2	33. 2	27. 3
313651.....	6. 2	62. 3	36. 8	30. 2
313651.....	7. 0	64. 6	32. 3	27. 3
313651.....	6. 7	62. 9	33. 8	28. 6
313651.....	6. 6	64. 9	37. 2	28. 4
313651.....	6. 4	64. 4	33. 0	28. 4
313651.....	6. 4	58. 3	34. 0	28. 3
Average.....	6. 56	62. 8	34. 2	28. 0
Greatest.....	7. 0	67. 3	38. 2	30. 8
Least.....	6. 2	56. 8	30. 0	24. 8

COCHLOSTYLA (CHRYSTALLIS) CANICEPS MAITA Bartsch

PLATE 114, FIGURE 7

1932. *Cochlostyla (Chrysallis) caniceps maita* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 342.

Shell rather large, elongate-ovate. The early nuclear whorls are soiled flesh-color; the last one is pale buff, and from that the shell grades on the last turn to the ground color, chestnut-brown. Over this are placed irregular more or less interrupted zones of grayish buff, which are best developed near the summit on the last turn; the stronger markings disappear on the last half. The aperture is bluish white, and the peristome is chocolate-brown with a purplish flush except the interior portion of the outer lip at its insertion, which again is flesh-color, while the parietal callus is pale brown. Nuclear whorls 3, the first smooth, the rest showing the markings of the postnuclear turns. The postnuclear whorls are marked by irregularly developed, closely spaced, retractorily slanting, flattened threads and fine, ill-defined, subobsolete spiral striations. In addition they are marked by the usual crisscross microscopic sculpture, which cuts the lines of growth obliquely. Aperture broadly ovate; outer lip broadly expanded and reflected. The inner lip likewise broadly expanded and reflected, particularly at its insertion where it almost covers the umbilicus, leaving only a narrow chink. The parietal wall is covered by a rather thick callus.

The type (U.S.N.M. no. 20351a) was collected by the Exploring Expedition presumably at the southern tip of Mindoro. It has lost the first nuclear whorl. The 5.8 remaining measure: Length, 71 mm; greater diameter, 38 mm; lesser diameter, 29.6 mm.

A young specimen from the same source is entered under the same number.

This race is also a member of the ovate-conic group and most closely resembles *C. caniceps contracostana* but is much larger than that form. The chocolate-brown peristome is also darker and of more uniform color than in *contracostana*.

COCHLOSTYLA (CHRYSTALLIS) CANICEPS CONTRACOSTANA Bartsch

PLATE 114, FIGURE 2

1932. *Cochlostyla (Chrysallis) caniceps contracostana* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 343.

Shell elongate-ovate. The early nuclear whorls are flesh-color, the last one pale buff, the succeeding turns gradually shade from this to light brown and to dark chestnut-brown. In the lighter turns there is a zone of light brown near the summit. In addition the whorls are marked by retractorily curved bands of pale buff or greenish buff.

These bands are of irregular width, shape, and spacing. On the last whorl they extend to the umbilical chink. The aperture is bluish white, and the peristome is edged with chestnut-brown. This color gradually fades inward until it merges with the white of the aperture at their junction. The inner lip is edged with brown, which also extends over the outer edge of the parietal callus. Nuclear whorls 2.9, the first smooth and the last one showing the markings of the post-nuclear whorls. The postnuclear whorls are very narrowly shouldered at the summit and are crossed by irregularly developed and spaced, retractively slanting, almost threadlike lines of growth, which are quite closely approximated. These pass over the periphery and base of the last whorl to the umbilical chink. In addition to this sculpture, the whorls are marked by the usual microscopic crisscross lines, which cut the lines of growth obliquely. The periphery of the last whorl is somewhat inflated, well rounded. The periphery is marked by a slender color line, which defines the border line between the spire and base. Base well rounded. Aperture broadly oval; outer lip expanded and reflected; inner lip decidedly expanded at its insertion, also reflected, covering the umbilicus excepting a broad chink. The parietal wall is covered by a moderately thick callus.

The type (U.S.N.M. no. 313554) was collected by Mr. Quadras and is labeled, "Contra Costa de Mindoro." It has 6.1 whorls and measures: Length, 62 mm; greater diameter, 35.2 mm; lesser diameter, 26 mm.

This race belongs to the elongate-ovate group and can be readily differentiated from *C. caniceps demesai* by its less brilliant coloration and smaller size and from *C. caniceps maita* by its smaller size.

COCHLOSTYLA (CHRYSTALLIS) CANICEPS CONICA Bartsch

PLATE 114, FIGURE 6

1932. *Cochlostyla* (*Chrysalis*) *caniceps conica* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 343.

Shell rather large, very regularly elongate-conic. The first two nuclear whorls flesh-color; the last one pale buff, which is also the color of the succeeding turn, but this rapidly shades into the chestnut color of the last two whorls. In addition the whorls are marked by irregularly placed axial bands of yellowish buff, which leave the brown interspaces on the posterior half of the turns very conspicuous. The basal half of the last whorl is almost unicolor, the darker parts showing through only in spots and the last portion of the last turn is also of this more or less solid color. The interior of the aperture is bluish white, and the expanded peristome is pale purplish brown with a narrow zone of dark purplish brown at the edge. This color also marks the outer edge of the peripheral callus. Nuclear whorls 3,

the first two well rounded, and smooth, the last one showing the beginning of the postnuclear sculpture. The postnuclear whorls are narrowly shouldered, almost flattened, and marked by irregular, decidedly retractively curved, almost threadlike incremental lines, which are closely approximated and which extend on the last whorl from the summit to the umbilical chink. In addition the whorls are marked by ill-defined spiral threads and the usual crisscross microscopic incised lines, which cut the lines of growth obliquely, both protractively and retractively. The aperture is oblique and broadly oval, with the outer lip decidedly expanded and reflected. The inner lip is also expanded, decidedly so at its insertion where it is reflected over the umbilicus, of which it leaves only a very narrow chink. The parietal wall is covered by a rather thick callus.

The type (U.S.N.M. no. 313555) was collected by von Möllendorff in southwestern Mindoro. It has 7 whorls and measures: Length, 73.1 mm; greater diameter, 36.9 mm; lesser diameter, 27.9 mm.

This subspecies can readily be distinguished from the others by its regularly conic outline.

COCHLOSTYLA (CHRYSTALLIS) CANICEPS CANICEPS Bartsch

PLATE 114, FIGURE 5; PLATE 115

1932. *Cochlostyla (Chrysalis) caniceps caniceps* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 343.

Shell elongate-conic. The first nuclear portion is flesh-color, which is succeeded by pale buff gradually shading into the dark chestnut-color of the last turn. In the early light-colored whorls there is a narrow zone of brown near the summit. In addition the whorls are marked by fulgurations and bands of pale-buff or yellowish-buff axial bands, which on the last whorl extend from the summit to the umbilical chink. The last whorl also shows a peripheral dark line separating the spire from the basal portion. The aperture is bluish white edged with dark chestnut-brown, which also extends over the outer portion of the peripheral callus. Nuclear whorls 2.8, the first two smooth, the last one showing the beginning of the postnuclear sculpture. The postnuclear whorls are very narrowly shouldered at the summit and crossed by retractively curved, irregular, and irregularly developed lines of growth, which are rather closely approximated and do not merit the term of threads. There are also fine, obsoletely incised spiral lines and the usual microscopic crisscross sculpture, which cuts the lines of growth obliquely both protractively and retractively on spire and base. The aperture is broadly ovate. The outer lip broadly expanded; the inner lip also expanded, decidedly so at its insertion where it is reflected over the umbilicus, of which it leaves only a narrow chink. Parietal wall covered by a rather heavy callus.

The type (U.S.N.M. no. 313556) was collected by the Menage Scientific Expedition, that is, by Drs. Worcester and Bourns, at Lake Naujan, Mindoro. It has 6 whorls and measures: Length, 59.3 mm; greater diameter, 30 mm; lesser diameter, 23.2 mm.

A hundred additional specimens (U.S.N.M. no. 313557) yield the following measurements:

Number of whorls	Length	Greater diameter	Lesser diameter
	<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
6.0	55.6	25.6	21.7
6.0	56.3	27.1	21.6
6.1	50.8	22.8	20.8
6.1	56.5	26.7	22.4
6.1	54.5	26.2	22.2
6.0	58.5	29.4	24.1
6.0	54.3	25.9	21.8
6.0	50.2	24.2	21.3
6.1	59.5	26.3	22.7
6.0	52.3	26.3	21.4
6.0	53.0	25.8	21.8
6.0	52.2	27.6	22.8
5.9	55.2	25.3	21.7
6.0	55.8	27.0	22.0
6.0	60.3	28.0	24.2
6.0	58.7	27.5	23.4
6.0	52.4	24.9	22.3
5.9	50.0	24.8	21.9
6.0	53.5	29.0	22.2
6.0	50.2	23.6	20.5
6.1	57.3	26.4	21.8
6.2	52.3	28.2	22.2
6.1	56.8	25.0	22.0
5.9	51.6	26.6	21.7
6.2	52.0	25.5	21.8
6.2	54.7	27.3	22.2
6.1	56.6	26.9	23.0
6.2	57.8	27.9	23.8
6.0	50.7	26.4	22.3
6.1	48.7	28.7	22.5
6.0	57.0	27.0	22.7
6.1	53.3	26.7	21.7
6.0	56.5	27.3	21.5
6.1	54.4	26.9	22.5
6.2	54.8	27.4	22.6
6.1	59.6	29.5	23.3
6.0	56.7	27.6	23.1
6.1	55.9	29.0	22.9
6.0	50.8	23.4	21.7
6.2	54.5	27.4	22.6
6.2	60.6	27.8	23.1
6.0	61.6	29.0	23.7
6.1	54.7	28.7	21.8
6.0	61.6	28.5	22.8
6.0	60.9	31.1	23.5
6.1	52.2	26.9	21.8
5.9	61.5	29.8	22.9
6.2	56.9	26.3	21.0
6.1	52.0	24.8	22.5
6.2	50.6	25.8	22.0
6.1	58.0	28.9	22.3
6.1	55.0	26.4	21.8
6.2	56.4	26.4	22.8
6.0	58.4	28.8	24.1

Number of whorls	Length	Greater diameter	Lesser diameter
	<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
6.0-----	54.9	26.5	23.4
6.0-----	61.5	30.0	24.0
6.0-----	56.2	27.2	21.7
5.9-----	48.5	25.2	21.0
6.0-----	52.0	25.4	20.1
5.9-----	54.4	25.0	20.8
6.0-----	54.5	24.5	21.8
6.2-----	59.8	29.8	23.6
6.0-----	55.5	28.8	22.7
5.9-----	51.6	26.9	22.7
6.1-----	59.1	27.2	22.6
6.1-----	52.5	25.5	21.1
6.0-----	50.7	26.6	22.7
6.1-----	56.9	28.2	22.2
6.1-----	53.4	26.3	21.9
6.1-----	58.0	27.6	24.2
6.0-----	54.0	26.4	21.8
6.1-----	53.8	24.5	20.7
6.0-----	51.9	27.8	22.9
6.1-----	55.9	25.3	21.3
6.0-----	52.6	26.5	21.8
6.2-----	53.2	27.1	22.3
5.9-----	57.8	26.6	22.0
5.9-----	52.3	25.7	20.6
6.0-----	53.6	28.3	24.2
6.0-----	51.6	24.4	21.2
5.9-----	56.7	27.0	22.9
6.0-----	54.8	28.2	22.9
6.1-----	50.5	24.5	23.0
6.1-----	56.8	27.6	22.2
6.0-----	54.2	25.9	22.3
6.2-----	60.2	30.0	21.7
5.9-----	50.1	24.9	24.4
6.1-----	51.2	24.4	21.0
6.1-----	47.6	24.4	21.5
5.8-----	58.6	27.6	21.0
5.9-----	57.8	27.8	22.0
6.1-----	50.2	26.2	22.0
6.2-----	55.6	27.8	21.0
6.0-----	59.0	28.4	22.3
5.8-----	42.0	21.4	21.0
6.0-----	50.0	26.0	19.5
6.1-----	54.0	24.0	23.2
5.9-----	48.4	24.8	22.2
5.9-----	48.6	25.0	20.5
5.9-----	48.6	25.0	20.7
6.039 ¹ -----	¹ 54.53	¹ 26.685	¹ 22.19
6.2 ² -----	² 61.6	² 31.1	² 24.4
5.8 ³ -----	³ 42.0	³ 21.4	³ 19.5

¹ Average.² Greatest.³ Least.

Our figure of 70 of these (pl. 115) shows how constant they are in characters. I have taken 70 specimens at random to convey the idea of the constancy of characters in the race *caniceps*, a constancy that holds equally good in the case of the races of *Cochlostyla* (*Chrysallis*) *aspersa*, *nigriceps*, etc. I call particular attention to this in order that it be understood that I am not dealing with selected specimens but with races of well-defined species.

COCHLOSTYLA (CHRYSTALLIS) CANICEPS MINUTA Bartsch

PLATE 114, FIGURE 3

1932. *Cochlostyla (Chrysallis) caniceps minuta* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 343.

Shell very small, elongate-conic. The first two nuclear whorls are flesh-color, the next pale buff gradually shading into the darker chestnut-brown ground color of the last turn. In addition the shell is marked by rather irregular, small, retractively slanting, axial streaks of pale greenish buff. These are almost threadlike, but near the summit of the turns they are gathered together into broader areas, which give to this portion of the shell the aspect of being falsely toothed. The base of the last whorl is a little darker than the spire and demarked definitely at the periphery. The interior of the aperture is bluish white. The peristome is pale chocolate-brown with a bluish flush. The inner lip is bluish white with the same chocolate-brown edging. Nuclear whorls 3, the first smooth, the second showing fine crenulations near the summit and the last showing the sculpture of the postnuclear turns. The postnuclear whorls are very feebly shouldered at the summit, moderately rounded, and marked by retractively curved, very irregular, roughish incremental threads, which pass over the periphery to the umbilicus of the last turn. The usual crisscross microscopic lines show wherever there is sufficient smoothness for it to become apparent. The aperture is broadly oval; the outer lip expanded and reflected; inner lip also decidedly expanded at its insertion and reflected over the umbilicus, which it almost covers. The parietal wall is covered with a thin callus.

The type (U.S.N.M. no. 313560) was collected by von Möllendorff at Mansalay, Mindoro. It has 5.5 whorls and measures: Length, 46 mm; greater diameter, 25.2 mm; lesser diameter, 20.7 mm.

Another specimen from the same source (U.S.N.M. no. 195431a) has 6.1 whorls and measures: Length, 51.3 mm; greater diameter, 25.2 mm; lesser diameter, 21.2 mm.

This race is most nearly related to *C. caniceps caniceps* but differs from it by its much smaller size and its little shaggier sculpture.

COCHLOSTYLA (CHRYSTALLIS) NIGRICEPS Bartsch

1932. *Cochlostyla (Chrysallis) nigriceps* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 343.

Shell elongate-ovate, with the base of the last whorl rather produced. The nuclear whorls are chocolate-brown; the postnuclear whorls are covered with a rather strong periostracum, which is marked by irregular zones and fulgurations of yellowish straw-color and brown. The interior of the aperture is bluish white. The expanded peristome is brown, fading to the bluish white on its inner margin. There is a

faint peripheral brownish zone. The parietal callus is also marked with a dark edge. Nuclear whorls 3, the first smooth, the last showing the sculpture of the postnuclear whorls. The postnuclear whorls are appressed at the summit, moderately rounded, and rendered rather rough by irregularly developed and somewhat irregularly spaced retractively curved incremental threads, which on the last whorl extend to the umbilical region. They are also marked by poorly expressed, fine spiral striations and the usual fine microscopic crisscross incised lines that cut the lines of growth at right angles. The aperture is broadly oval; the peristome is decidedly expanded and reflected, that of the inner lip being broadly expanded at its insertion where it is reflected over the umbilicus, which it almost covers. The parietal wall is covered by a rather thick callus.

This species recalls strongly *Cochlostyla* (*Chrysallis*) *caniceps*, from which it can at once be distinguished by its dark nuclear turns. So far it is known from the eastern and southwestern coasts of Mindoro. I am recognizing three races of it: *Cochlostyla* (*Chrysallis*) *nigriceps nigriceps*, from the region of Lake Naujan; *C. (C.) n. nubifer*, from southwestern Mindoro; and *C. (C.) n. obnubila* from Binuangan, northwestern Mindoro.

KEY TO THE SUBSPECIES OF COCHLOSTYLA (CHRYSALLIS) NIGRICEPS

Ground color chocolate-brown.

Greater diameter more than 30 mm.....*nubifer*

Greater diameter less than 30 mm.....*nigriceps*

Ground color blackish brown.....*obnubila*

COCHLOSTYLA (CHRYSALLIS) NIGRICEPS NUBIFER Bartsch

PLATE 113, FIGURE 1

1932. *Cochlostyla* (*Chrysallis*) *nigriceps nubifer* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 343.

Shell elongate-conic. All the nuclear whorls dark chocolate-brown. The postnuclear whorls are chestnut-brown overlaid with a rather thick periostracum, which is marked by fulgurations and cloudings of soiled straw-color. The base is considerably darker than the space between the summit and the periphery, the distinction between the two being indicated by a sharp line. Interior of the aperture bluish white; peristome chocolate-brown. The inner edge of the peristome gradually fades into the color of the aperture. The inner portion of the insertion of the columella is also light in tone, while the parietal callus is dark-edged. Nuclear whorls almost 3, the first smooth, the second one showing fine incremental lines, and the last one the rough sculpture of the postnuclear turns. The postnuclear turns are slightly rounded, appressed at the summit and marked by irregularly developed and spaced, retractively curved, threadlike incremental lines. In

addition to the axial sculpture, the whorls are marked by mere indications of obsolete spiral lines and the usual microscopic crisscross sculpture. The aperture is broadly oval; peristome is broadly expanded. The columella is reflected over and almost covers the umbilical chink.

The type (U.S.N.M. no. 195408) was collected by von Möllendorff in southwestern Mindoro. It has 6.2 whorls and measures: Length, 63.6 mm; greater diameter, 32.2 mm; lesser diameter, 25.4 mm.

Six additional specimens without specific locality are referable here: Two from the Redfield collection (U.S.N.M. no. 309414) have 6.3 and 6 whorls and measure: Length, 63.2 and 58.1 mm.; greater diameter, 30.2 and 31.8 mm; lesser diameter, 24.1 and 25.3 mm, respectively. Two others (U.S.N.M. no. 104347), collected by Lieutenant Febiger, have 6 whorls each and measure: Length, 58.2 and 62.9 mm; greater diameter, 31.5 and 31.3 mm; lesser diameter, 24.3 and 24.9 mm, respectively. The last two (U.S.N.M. no. 315639) come from the Evezard collection. They have 6 whorls and measure: Length, 61.2 and 57 mm; greater diameter, 31.3 and 30.3 mm; lesser diameter, 55 and 54.6 mm, respectively.

This subspecies is nearest related to *Cochlostyla (Chrysallis) nigriceps nigriceps*, from which it is distinguished by its larger size.

COCHLOSTYLA (CHRYSALLIS) NIGRICEPS NIGRICEPS Bartsch

PLATE 113, FIGURE 3

1932. *Cochlostyla (Chrysallis) nigriceps nigriceps* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 343.

Shell elongate-ovate. The first half of the nuclear turns is pale chocolate-color, the rest dark chocolate-color. The postnuclear whorls are of a chocolate ground color, covered with a rather thick periostracum, which causes the surface of the shell to look axially streaked with yellowish straw-color and brown retractively slanting bands and fulgurations. There is a faint peripheral zone of brown present, and the base is inclined to be slightly darker than the posterior portion of the last whorl. The aperture is bluish white within, gradually changing to chocolate-brown on the expanded peristome. This brown coloration also extends over the edge of the parietal callus. The first nuclear whorl is well rounded and smooth, the next one shows the beginning of the lines of growth, and the third and last one is sculptured like the postnuclear turns. The postnuclear turns are moderately rounded, appressed at the summit, and marked by retractively curved, irregularly developed and irregularly spaced, somewhat threadlike, axial lines of growth, which are retractively curved. These extend over the base into the umbilical chink on the last whorl. In addition there are fine, poorly expressed, spiral striations and the

crisscross sculpture referred to in the description of the species. The aperture is broadly oval; the peristome is strongly expanded reflected, particularly so in the anterior portion of the outer lip and also at the insertion of the columella where it is reflected over the umbilicus which it almost covers. The parietal callus is rather heavy.

The type (U.S.N.M. no. 313716) was collected at Lake Naujan Mindoro, by the Menage Expedition. It has 6.5 whorls and measures: Length, 62.8 mm; greater diameter, 28.8 mm; lesser diameter, 22.7 mm.

Ten additional specimens (U.S.N.M. no. 313717) from the type locality yield the following data:

Number of whorls	Length	Greater diameter	Lesser diameter
	<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
6.2-----	57.3	28.0	22.4
6.1-----	57.6	28.4	23.2
5.9-----	53.7	28.3	24.0
5.9-----	58.7	28.5	24.0
6.0-----	52.8	27.8	22.5
6.0-----	61.0	27.5	23.8
6.4-----	62.3	29.8	23.0
5.9-----	53.8	27.0	21.8
5.8-----	52.1	26.0	21.8
5.9-----	52.0	26.1	21.3

Two specimens (U.S.N.M. no. 195431) from Mansalay Bay yield the following data: Number of whorls, 6.1 and 5.9; length, 56.3 and 54 mm, greater diameter, 28.8 and 27.4 mm; lesser diameter, 23.3 and 21.5 mm, respectively.

This subspecies is nearest related to *Cochlostyla (Chrysallis) nigriceps nubifer*, from which it is distinguished by its lesser size.

COCHLOSTYLA (CHRYSALLIS) NIGRICEPS OBNUBILA Bartsch

PLATE 113, FIGURE 2

1932. *Cochlostyla (Chrysallis) nigriceps obnubila* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 343.

Shell elongate-ovate. The nuclear whorls are very dark chocolate-brown. The first postnuclear whorl is intermediate in ground color between this and the rest of the postnuclear whorls, which are dark chestnut-brown. The postnuclear whorls are covered with a thin periostracum, which is irregularly banded, blotched, spotted, and clouded with hydrophanous markings of buff. The interior of the aperture is pale blue; the expanded peristome is bright blue, which is also the color of the outer columellar edge, the inner corresponding with the interior of the aperture. Nuclear whorls 3, the early ones showing incremental lines, the later ones the postnuclear sculpture.

The postnuclear whorls are rather high between summit and suture, appressed at the summit, very slightly rounded, and marked by re-tractively slanting incremental lines, which are almost threads and which are of varying width. In addition the postnuclear whorls are marked on both spire and base by fine spiral striations and the usual crisscross sculpture. The suture is moderately constricted. The periphery is obsoletely angulated. There is no dark zone differentiating the base from the spire. The base is produced, well rounded; aperture oval; the outer lip broadly expanded and reflected. The columella is likewise rather broadly expanded at its insertion and reflected to leave only a narrow umbilical chink.

The type (U.S.N.M. no. 313718), collected by Mr. de Mesa at Binuangan, Municipality of Paluan, northwest Mindoro, has 6.4 whorls and measures: Length, 61.7 mm; greater diameter, 29.8 mm; lesser diameter, 24.6 mm.

Two topotypes (U.S.N.M. no. 313719) from the same source yield the following measurements: 6.2 and 5 whorls; length, 60.2 and 55.2 mm; greater diameter, 29.7 and 26.2 mm; lesser diameter, 24.5 and 21.8 mm, respectively.

This subspecies is readily distinguished from the others by having the ground color blackish brown, therefore much darker than the other two subspecies. Also, the hydrophanous clouding is lighter and much more pronounced.

COCHLOSTYLA (CHRYSTALLIS) PERTURBATOR Bartsch

PLATE 114, FIGURE 4

1932. *Cochlostyla (Chrysallis) perturbator* BARTSCH, Journ. Washington Acad. Sci., vol. 22, p. 343.
1933. *Helicostyla (Chrysallis) mindoroensis ilogana* CLENCH and ARCHER, Papers Michigan Acad. Sci., Arts, Letters, vol. 17, p. 545, pl. 58, fig. 4 (not *ilogana* Bartsch, 1932).

The shell is of medium size, ovate. The early nuclear whorls are white; the later and the early postnuclear whorls are buff with a slender brownish line near the summit. The next to the last whorl is pale chestnut-color, while the last one has almost a blackish-brown ground color. The postnuclear whorls are covered with a moderately thick periostracum, which is crossed by hydrophanous bands, cloudings, or fulgurations of olivaceous-buff between which the ground color shines through. On the last turn in most of our specimens the hydrophanous portion is almost complete. The interior of the aperture is pale blue. The expanded peristome is chocolate-brown with an iridescent flush. This is also the color of the outer portion of the expanded inner lip, the inner portion coinciding with the color scheme of the interior of the aperture. Nuclear whorls 3.2, the first smooth,

the succeeding marked by lines of growth, which gradually become intensified on the remaining whorls until they reach the strength of the postnuclear sculpture. The later turns are also marked by microscopic fine spiral striations. The postnuclear whorls are inflated and moderately rounded, appressed at the summit and crossed by numerous, closely spaced, almost threadlike, retractively curved, lines of growth, which extend over both spire and base. In addition the entire shell is marked with numerous microscopic, closely spaced, incised spiral lines and the usual fine crisscross sculpture. The aperture is broadly oval; the outer lip is decidedly expanded and reflected; the columella is also expanded and reflected to form a moderately large umbilicus. The parietal wall is covered by a thick callus.

The type (U.S.N.M. no. 313720), collected by Pedro de Mesa at Tara, Abra de Ilog, Mindoro, has 6.5 whorls and measures: Length, 55.2 mm; greater diameter, 31.6 mm; lesser diameter, 26.3 mm.

U.S.N.M. no. 313663 contains 23 topotypes, which yield the following data:

Number of whorls	Length	Greater diameter	Lesser diameter
	<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
6.3-----	51.4	28.7	24.1
6.0-----	51.9	28.4	23.7
6.2-----	50.0	28.2	23.5
6.5-----	54.1	29.0	23.9
6.1-----	49.0	29.6	23.2
6.3-----	49.5	27.8	23.1
6.4-----	53.2	28.0	23.4
6.1-----	50.0	29.0	23.3
6.1-----	51.9	29.7	23.3
5.9-----	49.8	30.8	25.0
6.0-----	53.2	28.9	25.0
6.3-----	54.7	29.4	24.0
6.1-----	53.6	30.4	24.5
6.4-----	58.2	32.5	26.5
6.2-----	56.3	29.4	24.7
6.7-----	57.5	29.3	24.0
6.2-----	52.4	27.3	23.6
5.9-----	48.3	28.6	22.7
6.1-----	52.9	26.3	23.1
5.8-----	48.0	29.3	24.4
6.1-----	54.6	31.9	25.1
6.0-----	50.6	28.4	23.4
6.5-----	51.7	29.1	24.1
6.2 ¹ -----	¹ 52.28	¹ 29.2	¹ 23.91
6.7 ² -----	² 58.2	² 32.5	² 26.5
5.8 ³ -----	³ 48.0	³ 26.3	³ 22.7

¹ Average.

² Greatest.

³ Least.

U.S.N.M. no. 313660 contains 14 specimens also collected by Pedro de Mesa at Anduyan, Paluan, Mindoro, which yield the following measurements:

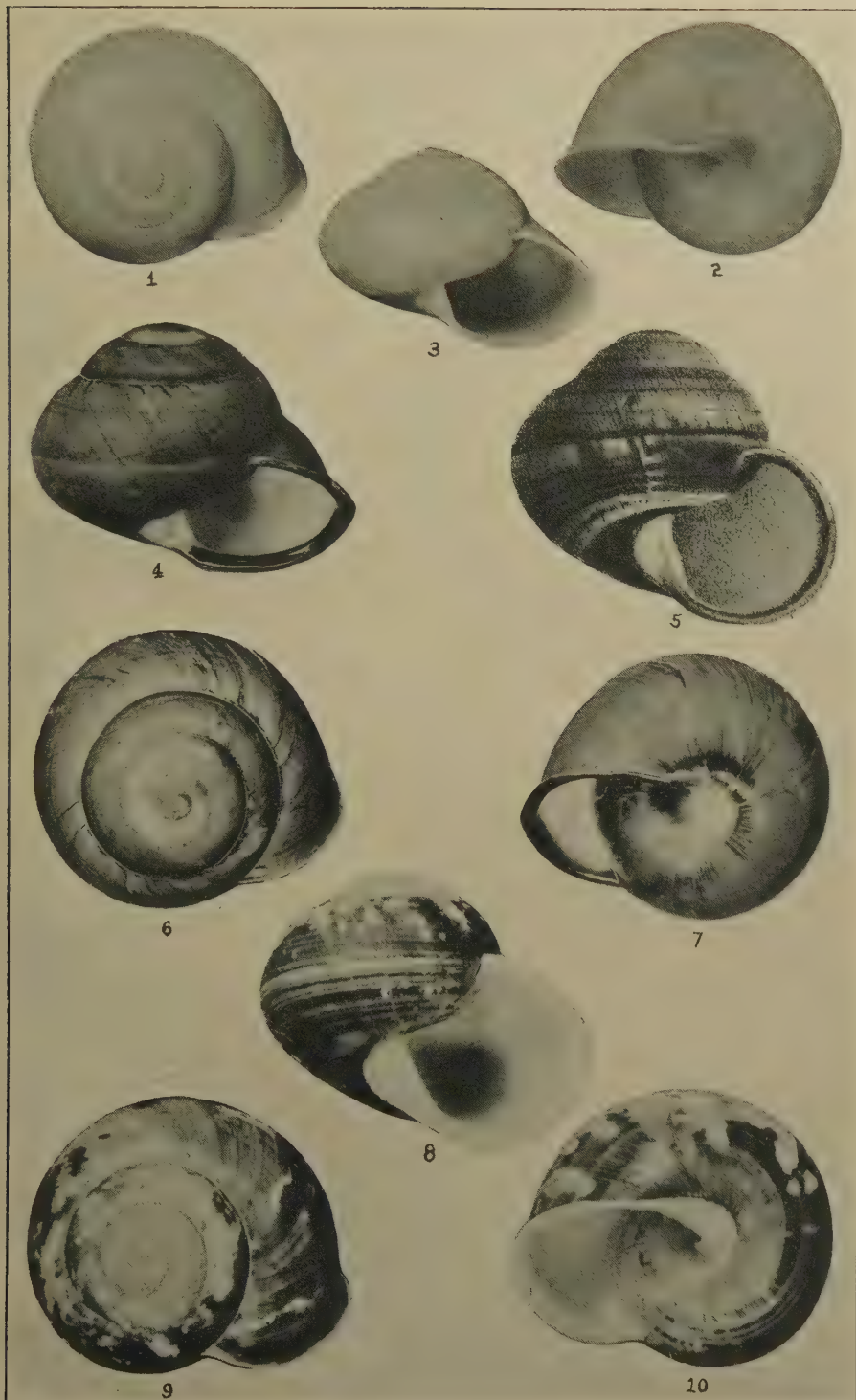
Number of whorls	Length	Greater diameter	Lesser diameter
	<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
6.2-----	55. 7	30. 9	25. 7
6.5-----	58. 0	31. 7	25. 0
6.0-----	52. 2	28. 7	23. 5
6.5-----	59. 3	31. 4	25. 2
6.1-----	52. 1	30. 6	25. 0
6.1-----	54. 0	31. 5	26. 0
6.2-----	53. 3	32. 3	26. 7
6.5-----	52. 3	29. 0	23. 9
6.1-----	52. 6	30. 2	23. 5
6.3-----	56. 6	28. 7	24. 5
6.2-----	57. 7	33. 3	26. 8
6.0-----	51. 0	30. 3	24. 9
6.1-----	52. 5	28. 7	23. 9
6.1-----	52. 7	29. 7	24. 5
6.2 ¹ -----	¹ 54. 28	¹ 30. 5	¹ 24. 93
6.5 ² -----	² 59. 3	² 33. 3	² 26. 8
6.0 ³ -----	³ 51. 0	³ 28. 7	³ 23. 5

¹ Average.² Greatest.³ Least.

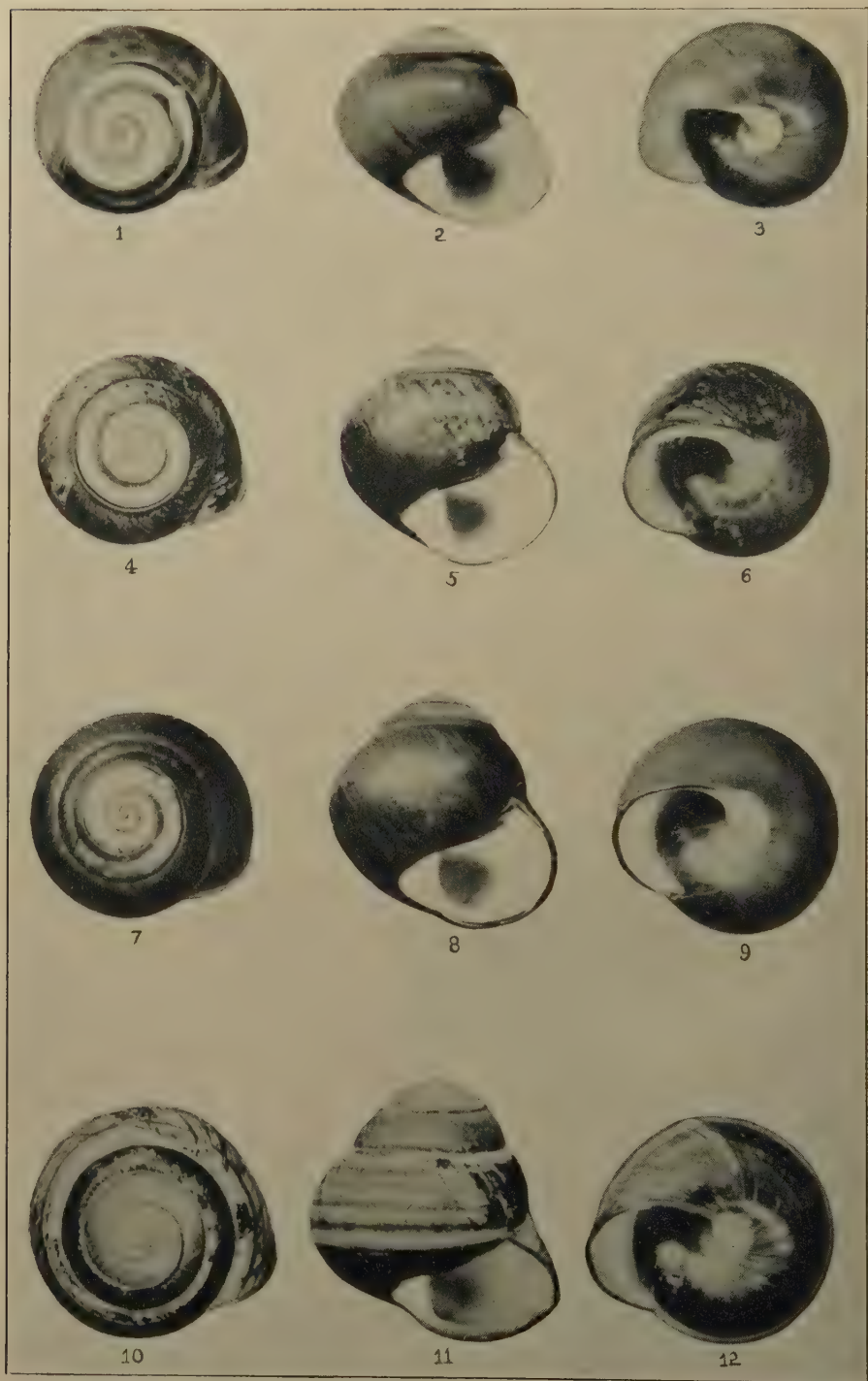
These agree so completely in every way with the specimen from Tara that I am wondering if a mistake may not have been made in their labeling. It is an extremely unusual state of affairs.

The ovate form, pale tip, exceedingly heavy periostracum, as well as the detail of color pattern, differentiate this species from the other *Cochlostylas* of Mindoro.

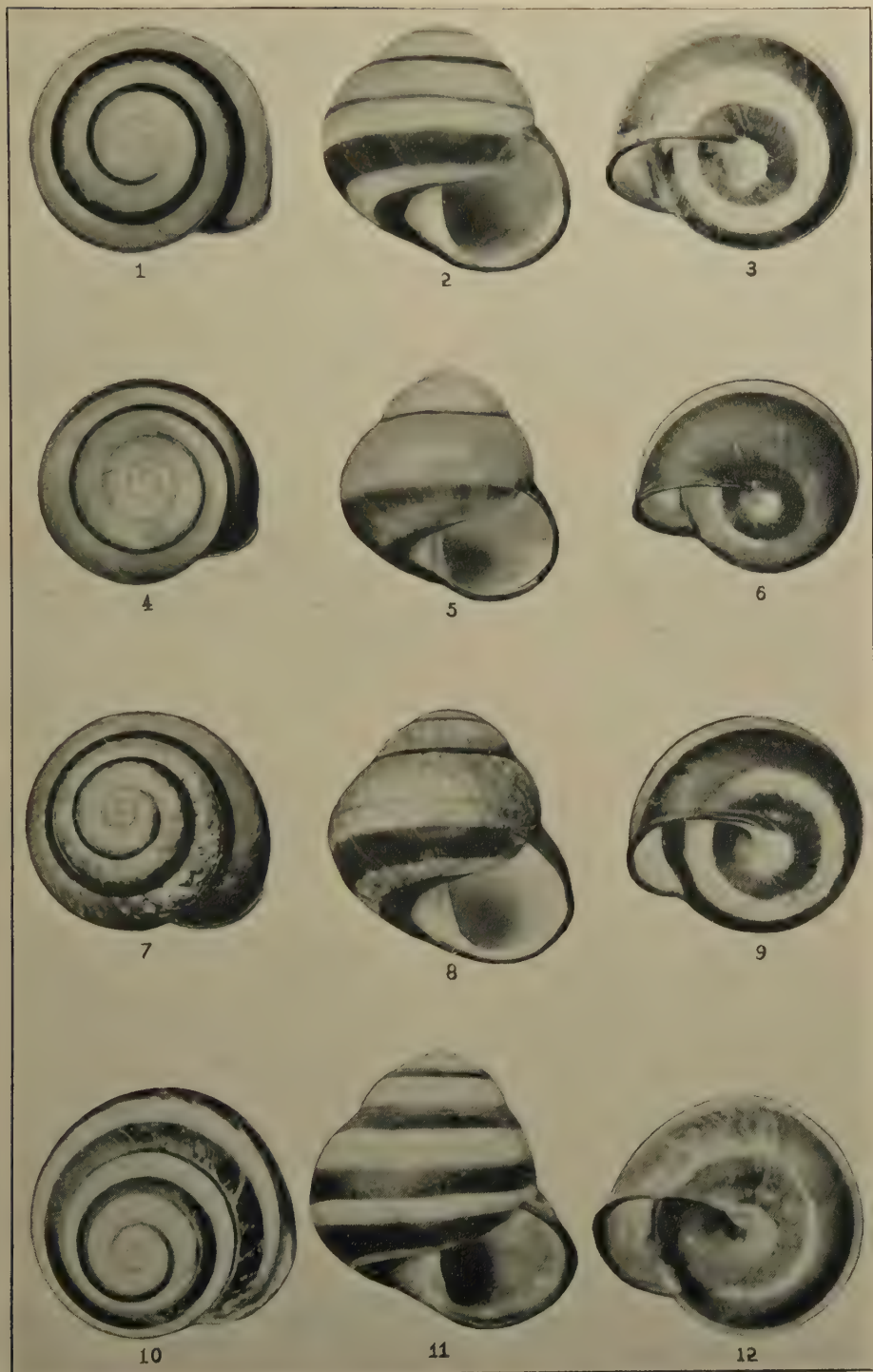




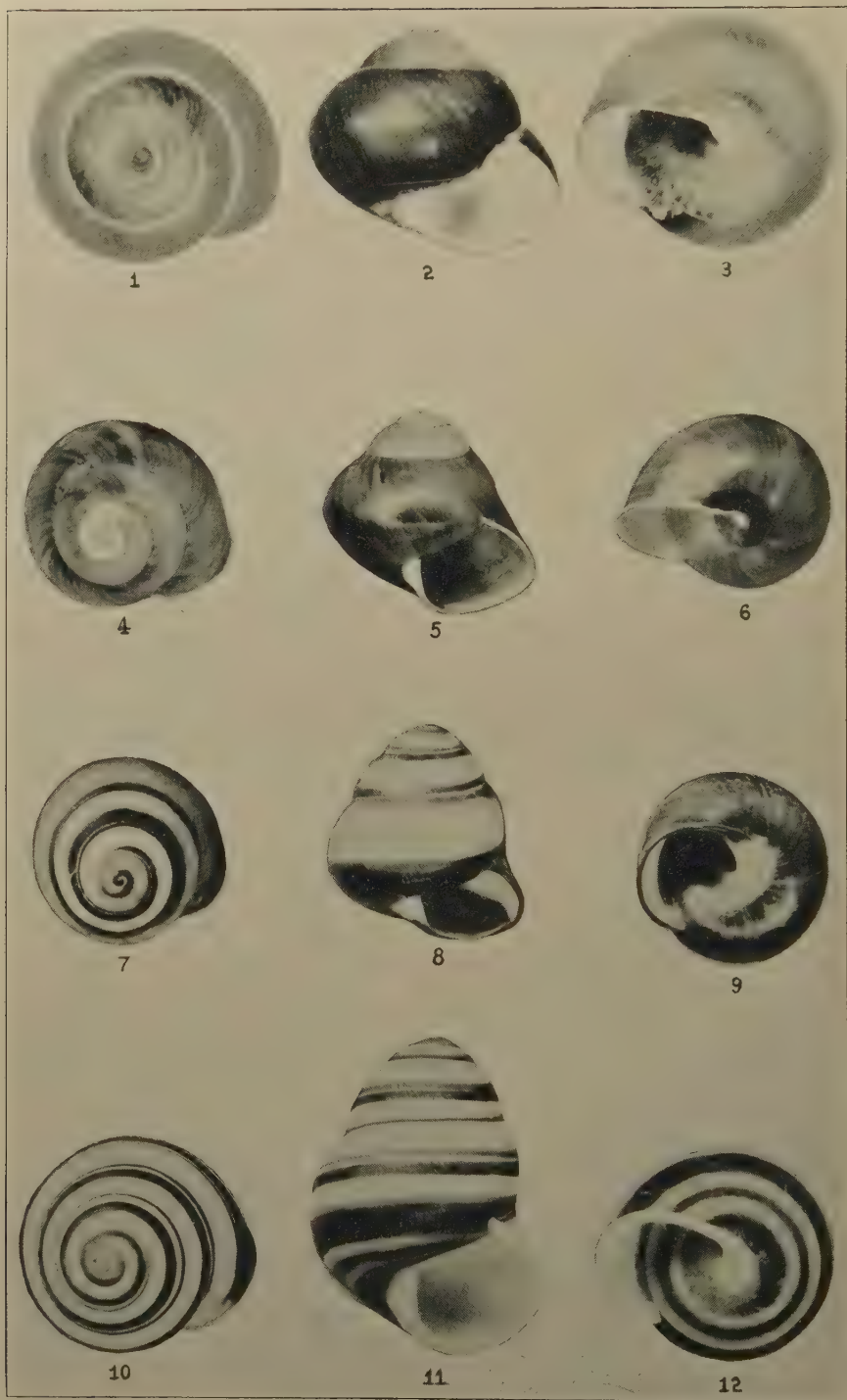
1-3, *Cochlostyla (Corasia) aegrota* (Reeve); 4-7, *C. (Calocochlea) melanocheila* (Pfeiffer); 8-10, *C. (C.) perpallida* Bartsch.



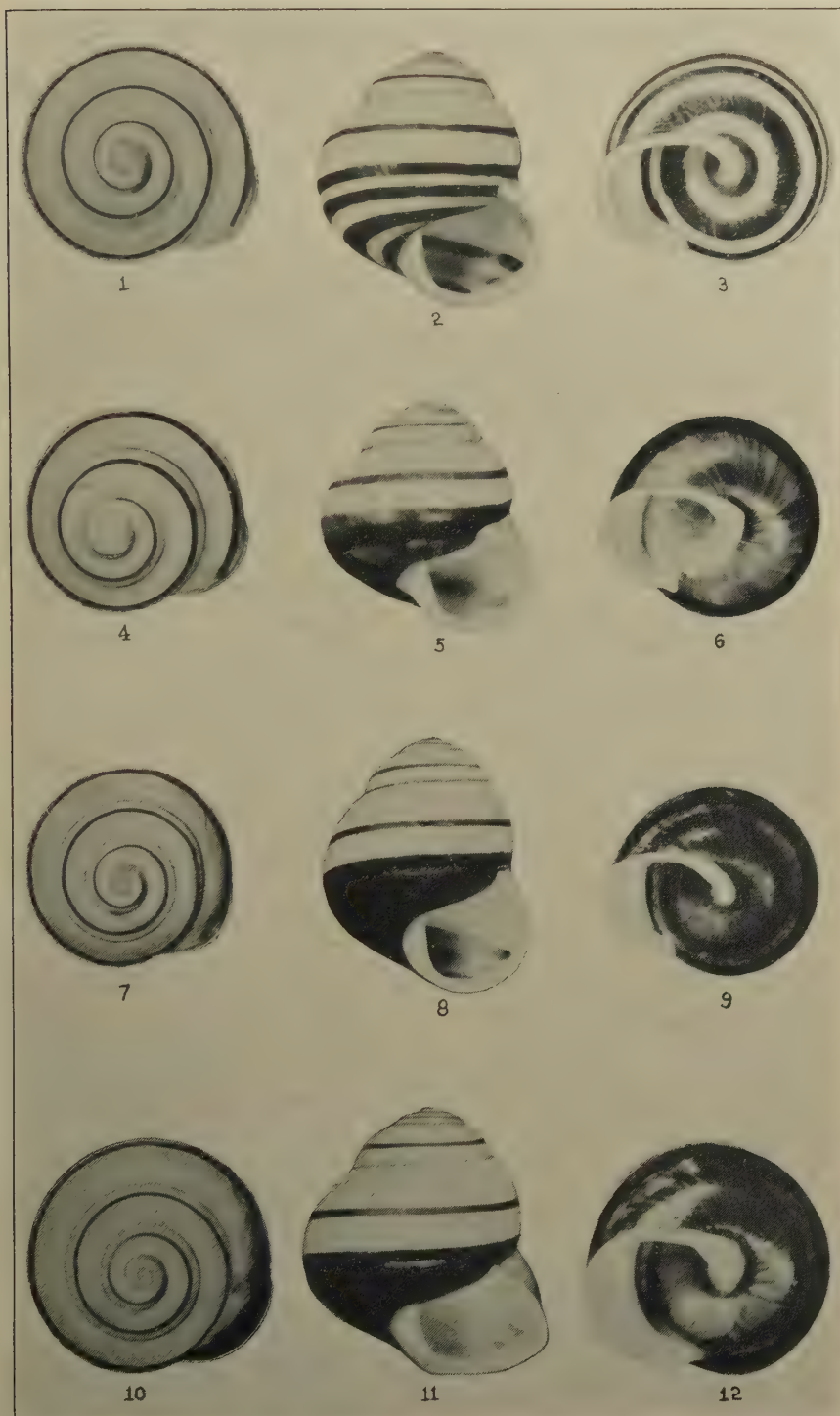
1-6, *Cochlostyla (Calocochlea) roissyana lutea* (Pfeiffer); 7-9, *C. (C.) r. subatra* Pilsbry; 10-12, *C. (C.) r. bartschi* Bartsch.



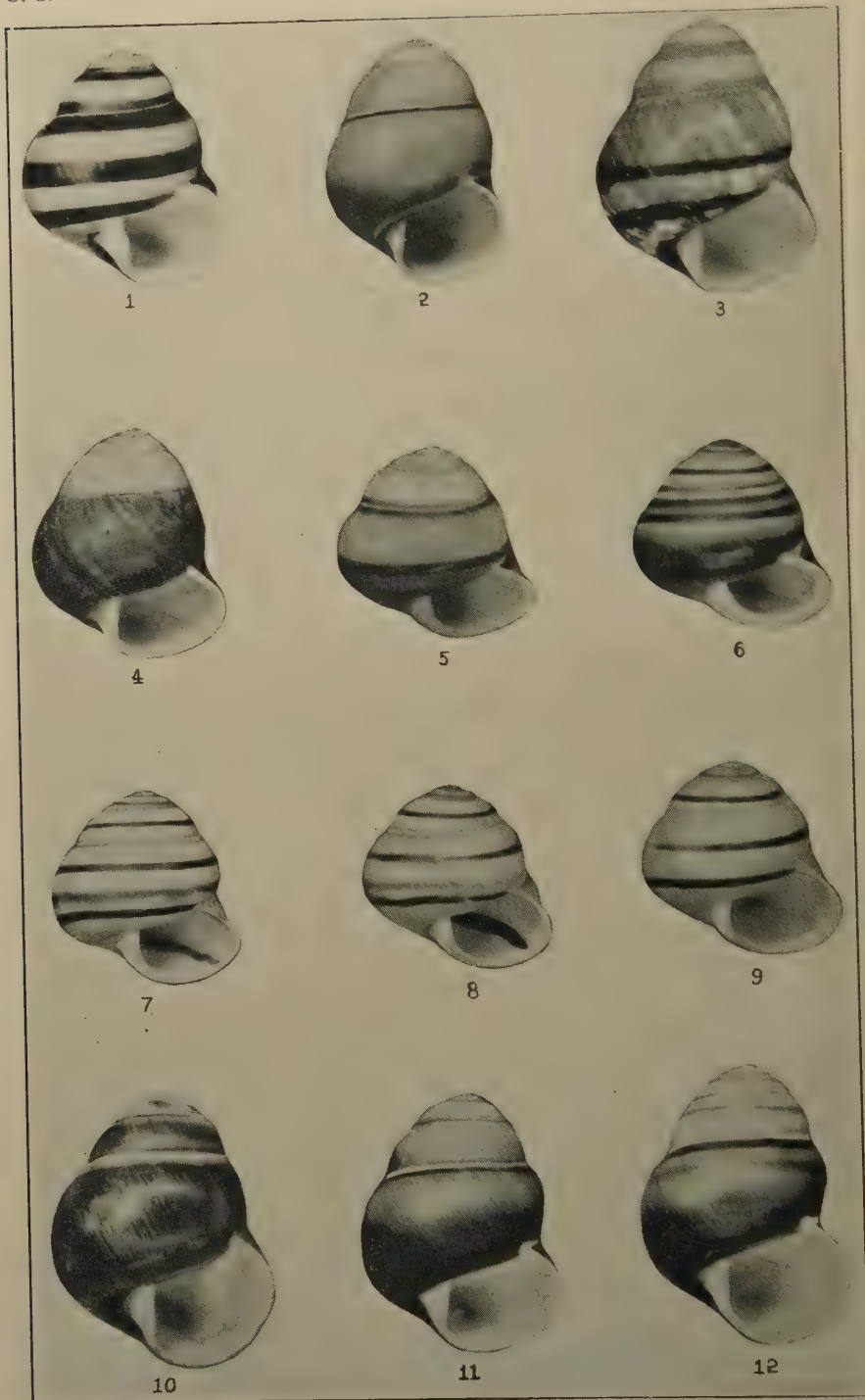
1-3, *Cochlostyla* (*Calocochlea*) *roissiana muntaysa* Bartsch; 4-6, *C. (C.) r. laymansa* Bartsch; 7-9, *C. (C.) r. roissiana* (Férussac); 10-12, *C. (C.) r. cavitala* Bartsch.



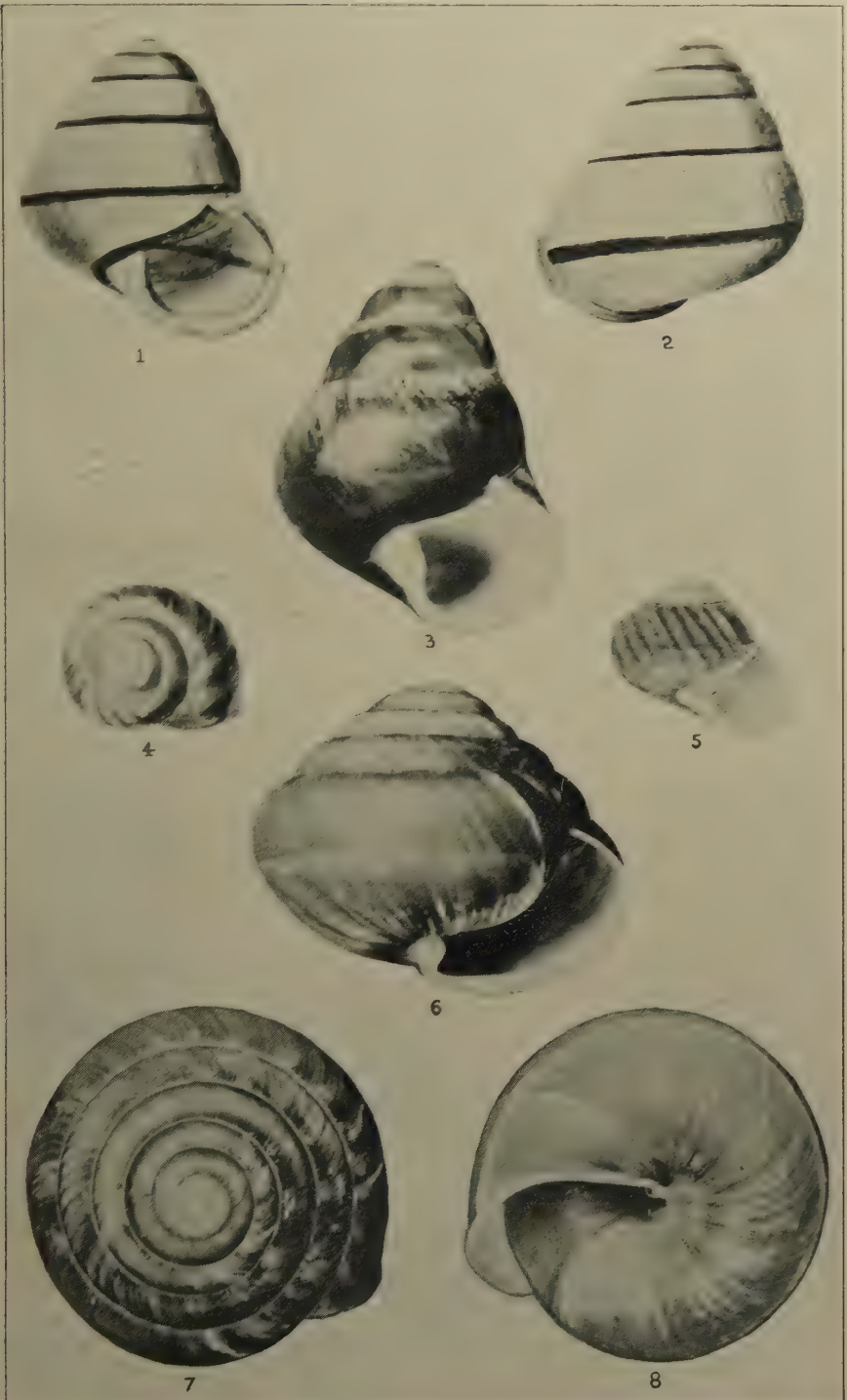
1-3, *Cochlostyla* (*Calocochlea*) *gertrudis* Möllendorff, Kobelt, and Winter; 4-6, *C. (Halocochlea) lillianae* Bartsch; 7-9, *C. (Helicostyla) dimera* (Jonas); 10-12, *C. (H.) fulgens johnsoni* Bartsch.



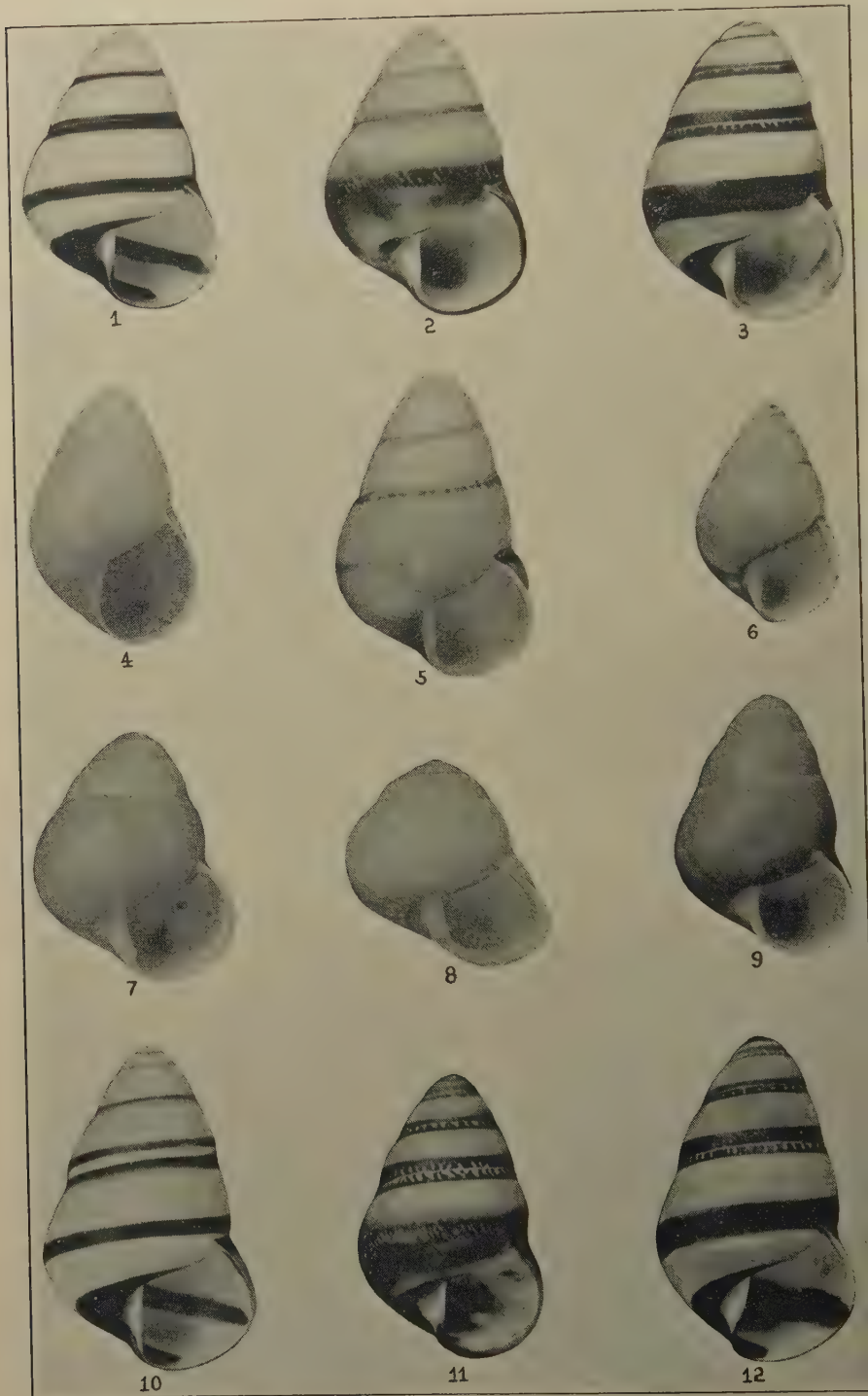
1-3, *Cochlostyla* (*Helicostyla*) *fulgens sapolana* Bartsch; 4-12, *C. (H.) f. fulgens* (Sowerby).



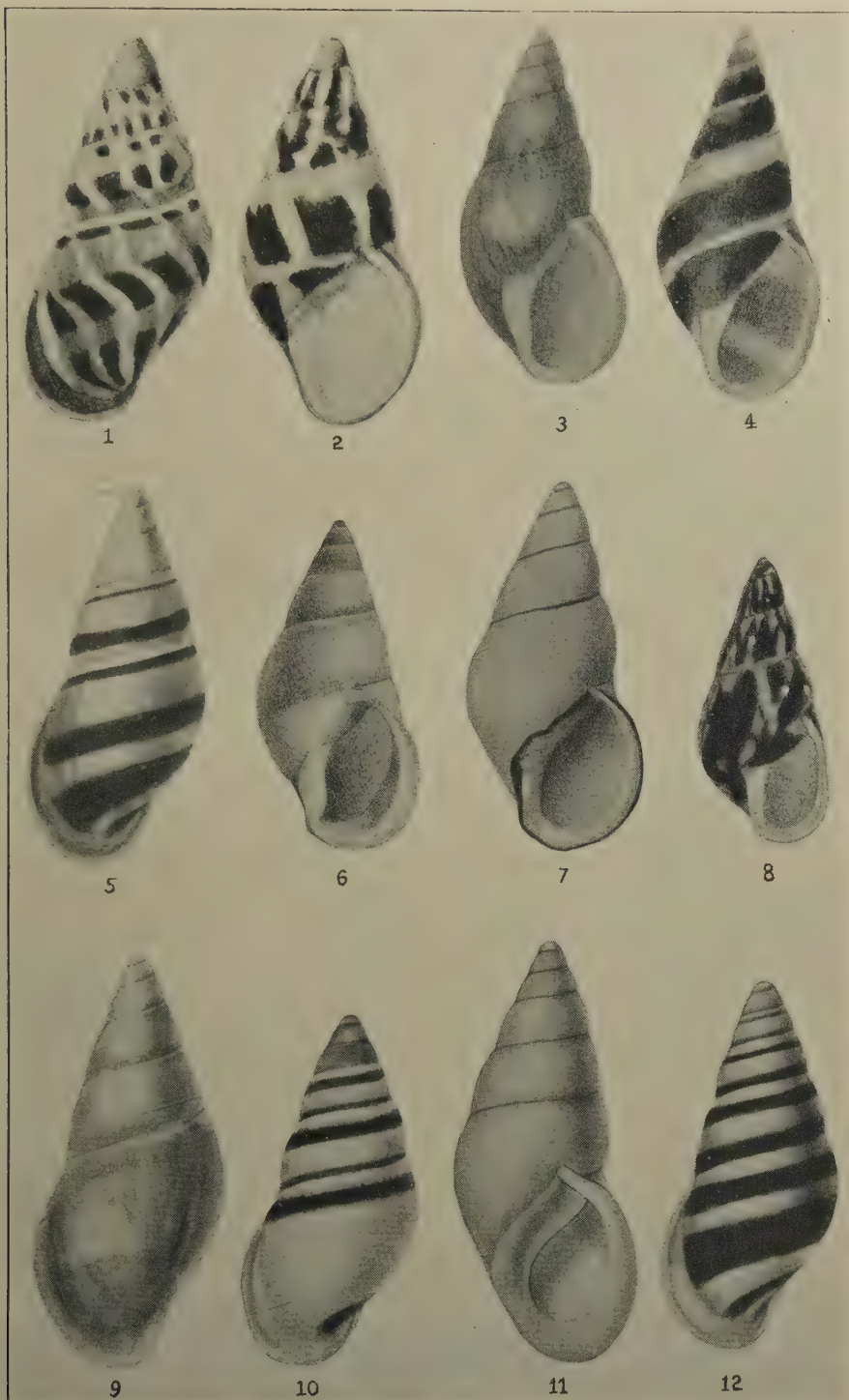
1, *Cochlostyla* (*Cochlostyla*) *hydrophana hydrophana* (Sowerby); 2, *C. (Cochlodryas) florida signa* Bartsch; 3, *C. (Cochlostyla) hydrophana varaderoana* Bartsch; 4, *C. (Cochlodryas) florida helicoides* (Pfeiffer); 5, *C. (C.) fastidiosa* Bartsch; 6, *C. (C.) orbitula* (Sowerby); 7, 8, *C. (C.) mateoi mateoi* Bartsch; 9, *C. (C.) m. sibolonensis* Bartsch; 10, *C. (C.) florida fuscolabiata* Möllendorff, Kobelt, and Winter; 11, *C. (C.) f. aureola* Bartsch; 12, *C. (C.) f. florida* (Broderip).



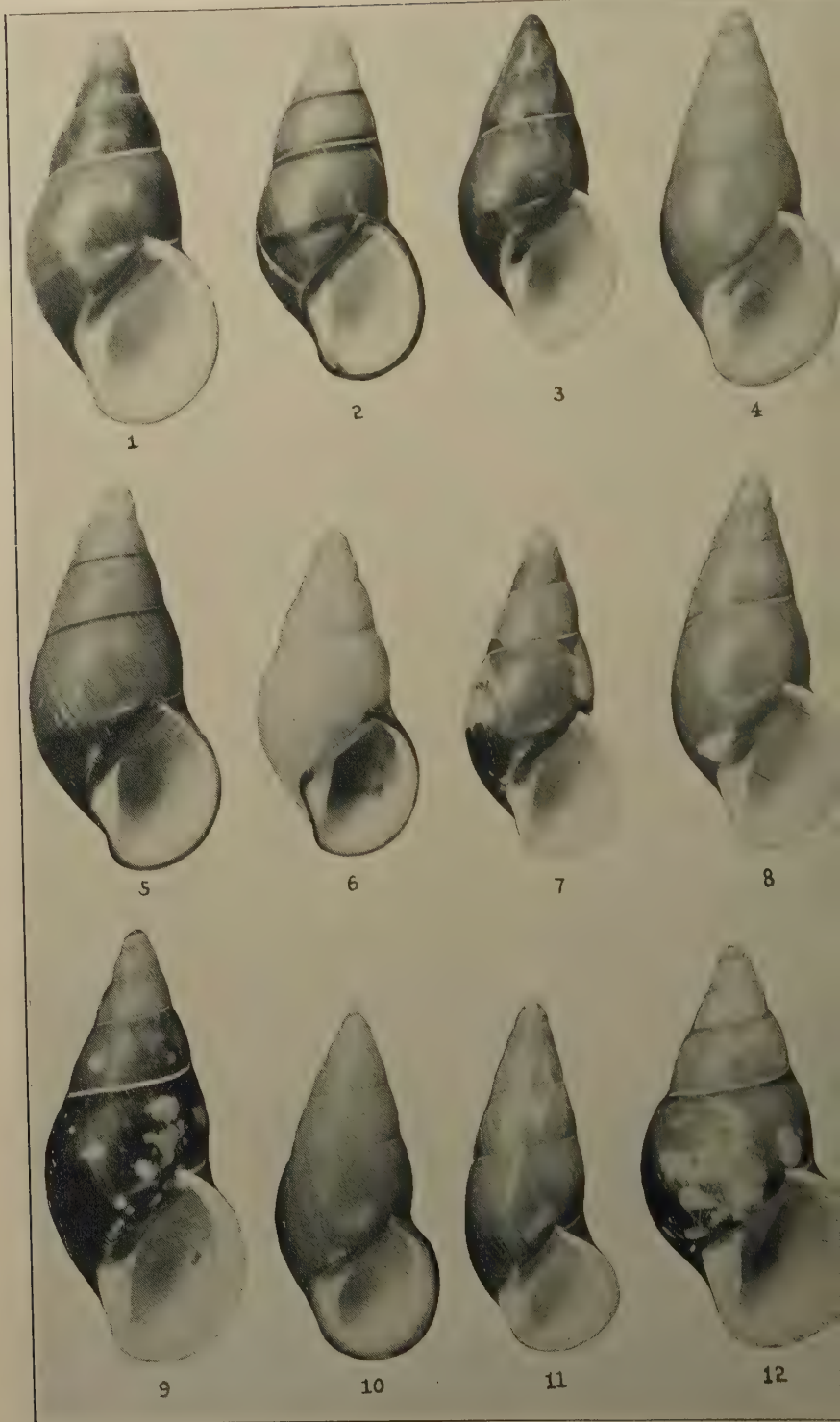
1, 2, *Cochlostyla (Helicobulimus) turbo* (Pfeiffer); 3, *C. (Orthostylus) euconica* Bartsch; 4, 5, *C. (Cochlodryas) decora* (Adams and Reeve); 6-8, *C. (Stenodryas) cepoides* (Lea).



1, *Cochlostyla* (*Hypselostyla*) *cincinnatiensis menagei* Bartsch; 2, *C. (H.) c. ultima* (Clench and Archer); 3, *C. (H.) c. guntingana* Bartsch; 4, *C. (Eudoxus) albina* (Grateloup); 5, *C. (H.) c. lubanensis* (Clench and Archer); 6, *C. (E.) simplex* (Jonas); 7, *C. (E.) jonasi* (Pfeiffer); 8, *C. (E.) canonizadoti* Bartsch; 9, *C. (E.) buschi* (Pfeiffer); 10, *C. (H.) cincinnatiensis cabrasensis* Bartsch; 11, *C. (H.) c. demesana* (Clench and Archer); 12, *C. (H.) c. cincinnatiensis* (Sowerby).



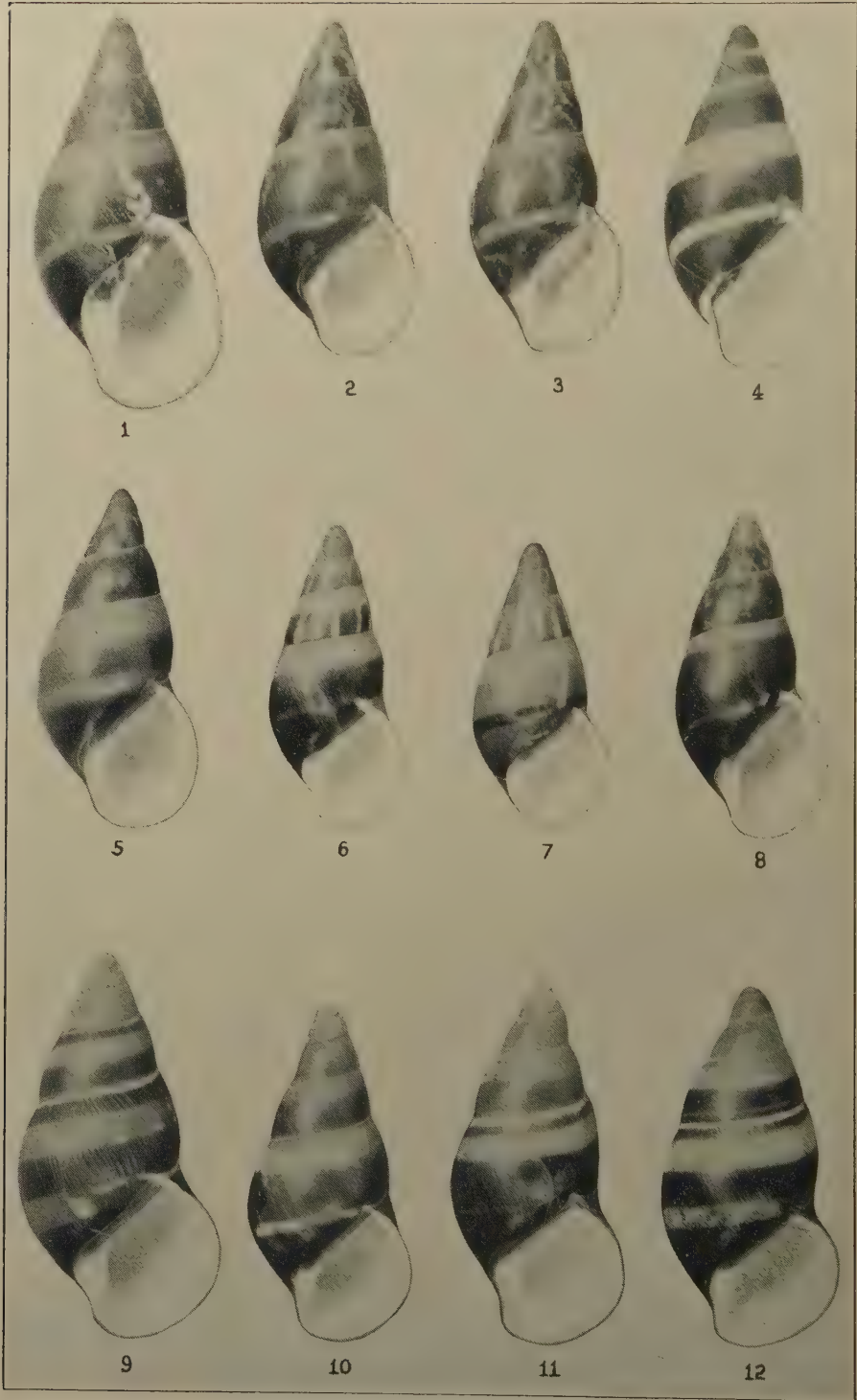
Copies of figures of shells upon which specific names were based and herein referred to *Cochlostyla* (*Prochilus*) *virgata* (Jay) (for detailed reference see pp. 458-459): 1, *Bulinus sylvanus* Broderip, *Cochlostyla* (*Prochilus*) *pulchrior* Pilsbry; 2, *Cochlostyla* (*Prochilus*) *pulchrior* Pilsbry; 3, *Bulinus porraceus* Jay; 4, *Bulinus virgatus* Jay; 5, *Bulinus sylvanus* Broderip; 6, *Bulinus labrella* Grateloup; 7, *Cochlostyla sylvanoides* Semper; 8, *Bulinus calobaptus* Jonas; 9, *Bulinus sylvanus* Broderip; 10-12, *Bulinus dryas* Broderip.



Mutations of *Cochlostyla (Prochilus) virgata* (Jay).



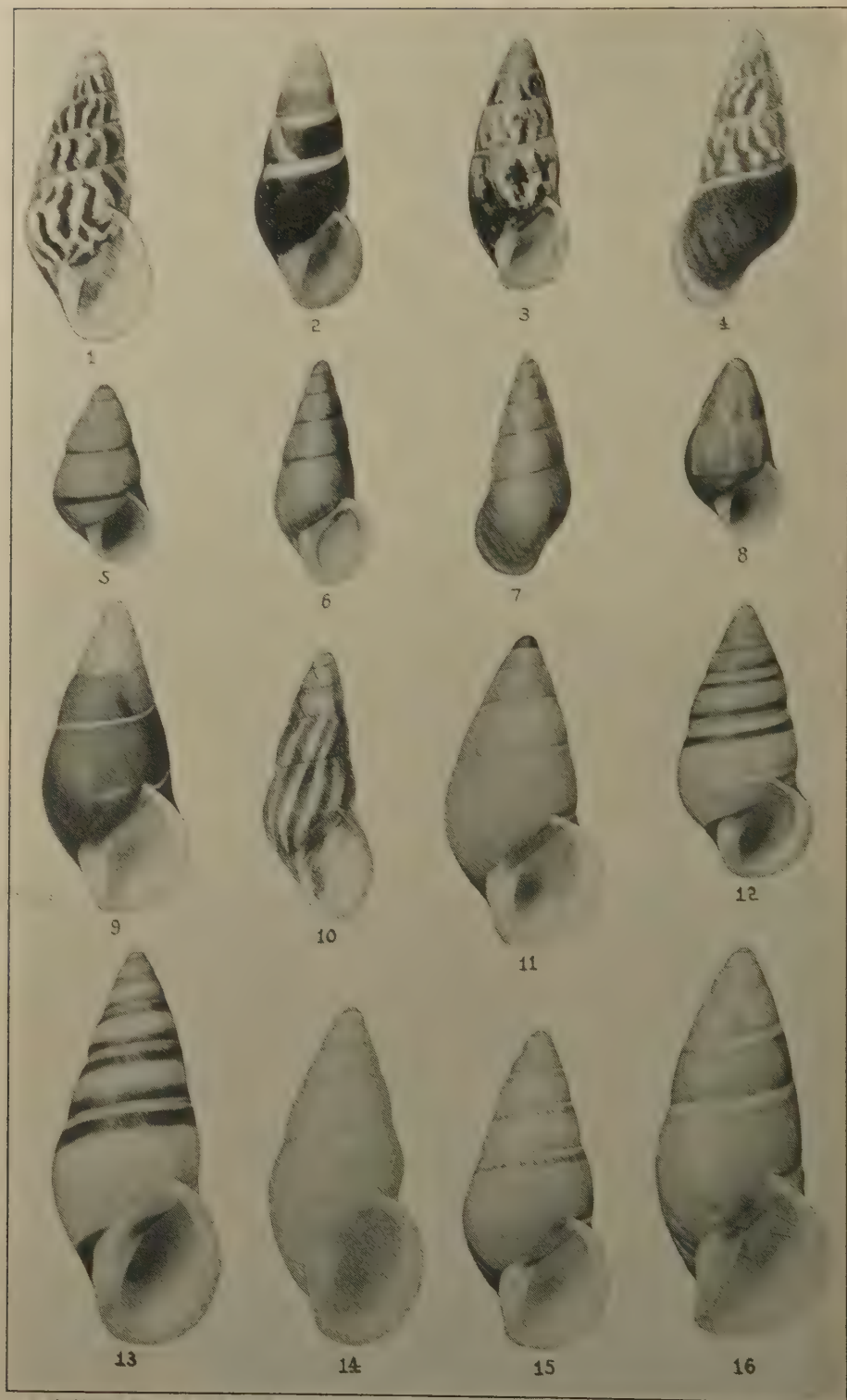
Mutations of *Cochlostyla* (*Prochilus*) *virgata* (Jay).



Mutations of *Cochlostyla (Prochilus) virgata* (Jay).



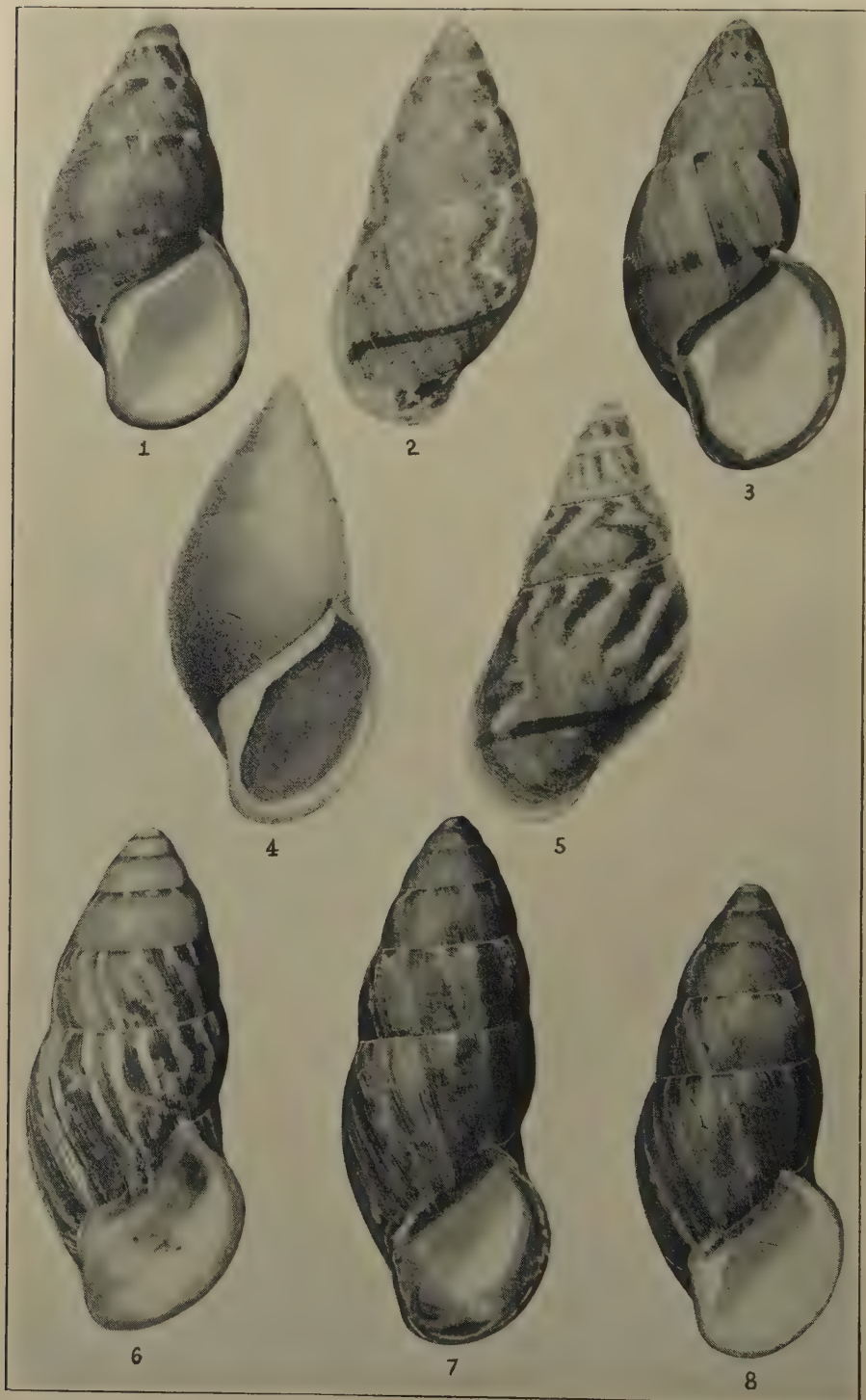
Range of variation in *Cochlostyla (Prochilus) partuloides* (Broderip).



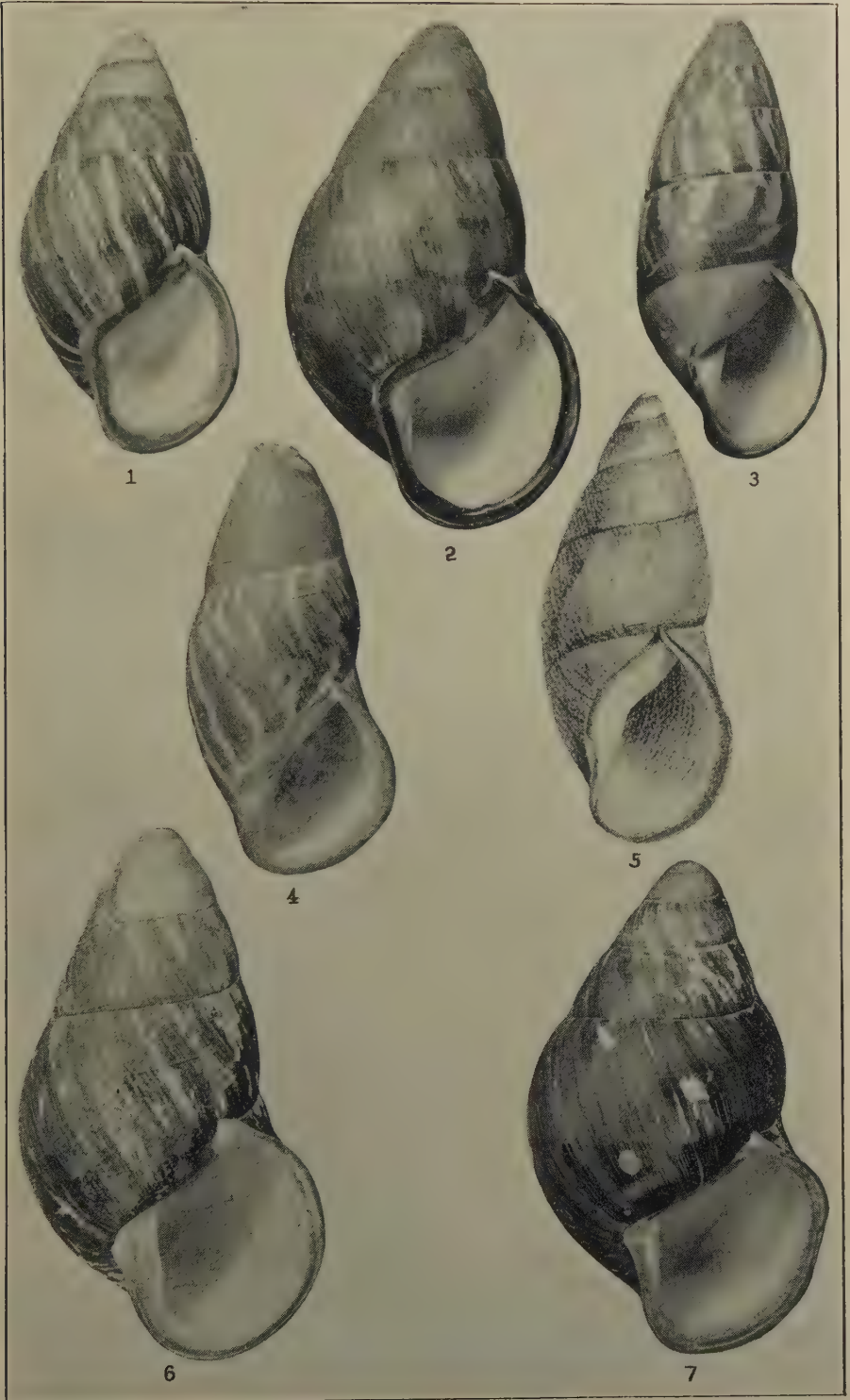
1. *Cochlostylia* (*Prochilus*) *fiatilis fiatilis* (Broderip) (copied from Sowerby); 2. *C. (P.) l. capucina* Bartsch; 3. *C. (P.) l. ambuionensis* Bartsch; 4. *C. (P.) l. fiatilis* (Broderip) (copied from Sowerby); 5. *C. (P.) capucensis contracta* Möllendorff; 6, 7. *C. (P.) fiatilis fulva* Bartsch; 8. *C. (P.) capucensis subpallida* Bartsch; 9. *C. (P.) cerina* Bartsch; 10. *C. (P.) fiatilis larenta* (Broderip) (copied from Sowerby); 11-16. *C. (P.)* sp.?



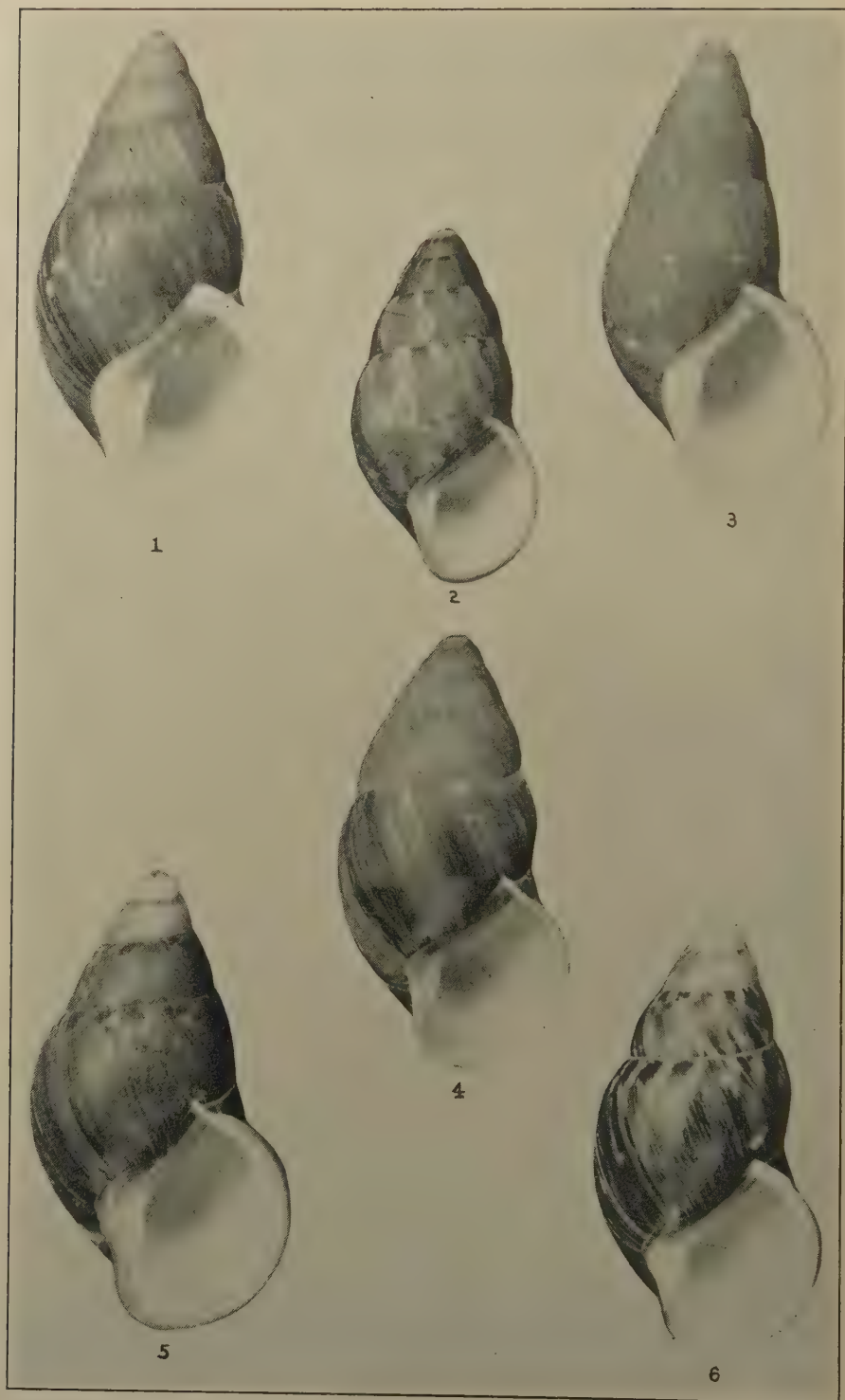
1, *Cochlostyla (Chrysallis) chrysalidiformis fuscata* Bartsch; 2, *C. (C.) c. villosa* Bartsch; 3, *C. (C.) c. enodosa* Bartsch; 4, *C. (C.) c. rarior* Bartsch; 5, *C. (C.) c. chrysalidiformis* (Sowerby); 6, *C. (C.) c. macra* Bartsch.



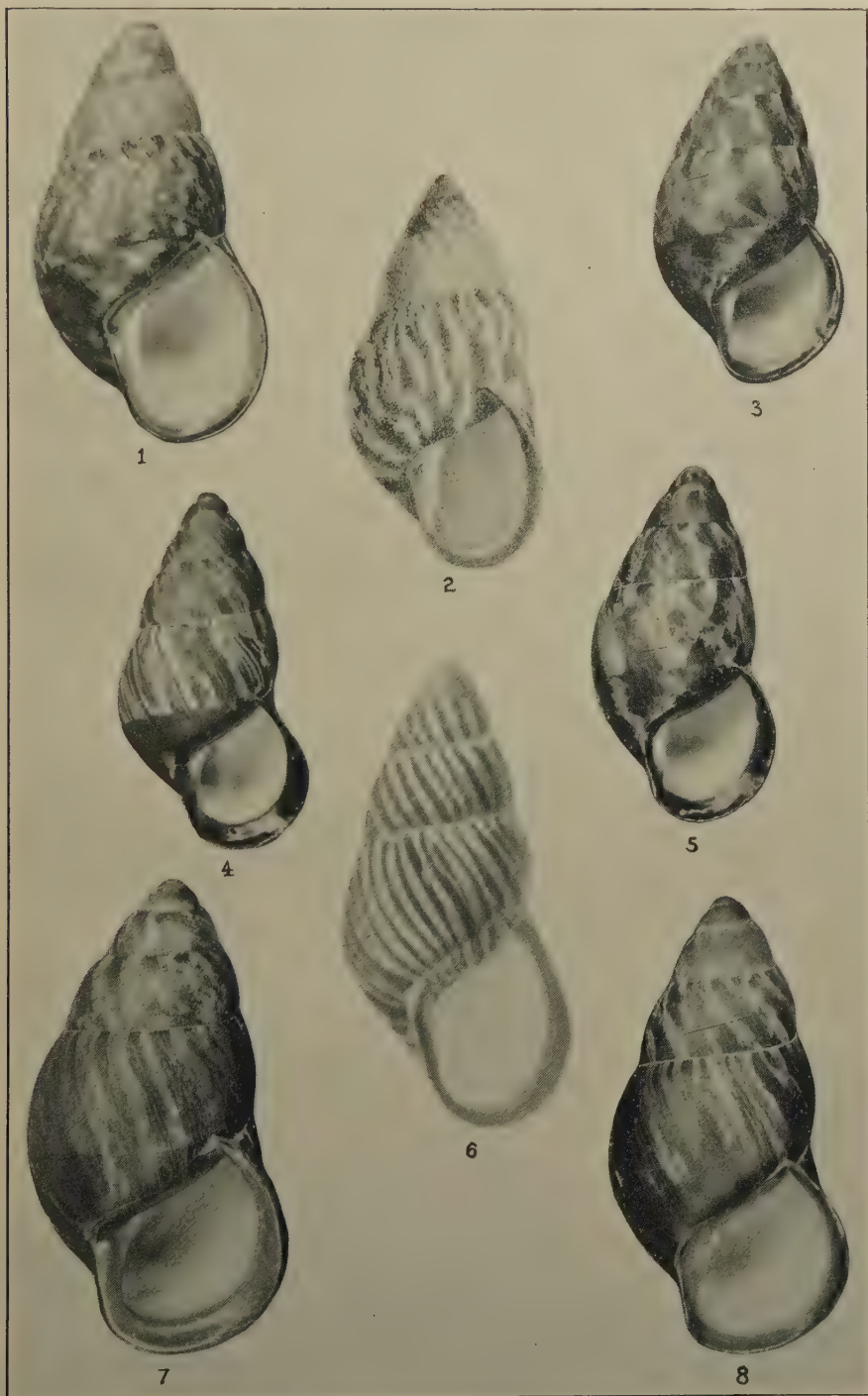
1, 2, *Cochlostyla (Chrysallis) electrica mangarina* Bartsch; 3, *C. (C.) e. bulalacaoana* Bartsch; 4, *C. (C.) petiti* Bartsch; 5, *C. (C.) electrica electrica* (Reeve) (copied from Reeve); 6, *C. (C.) jayi jayi* Bartsch; 7, *C. (C.) j. camorongana* Bartsch; 8, *C. (C.) j. perpusilla* Bartsch.



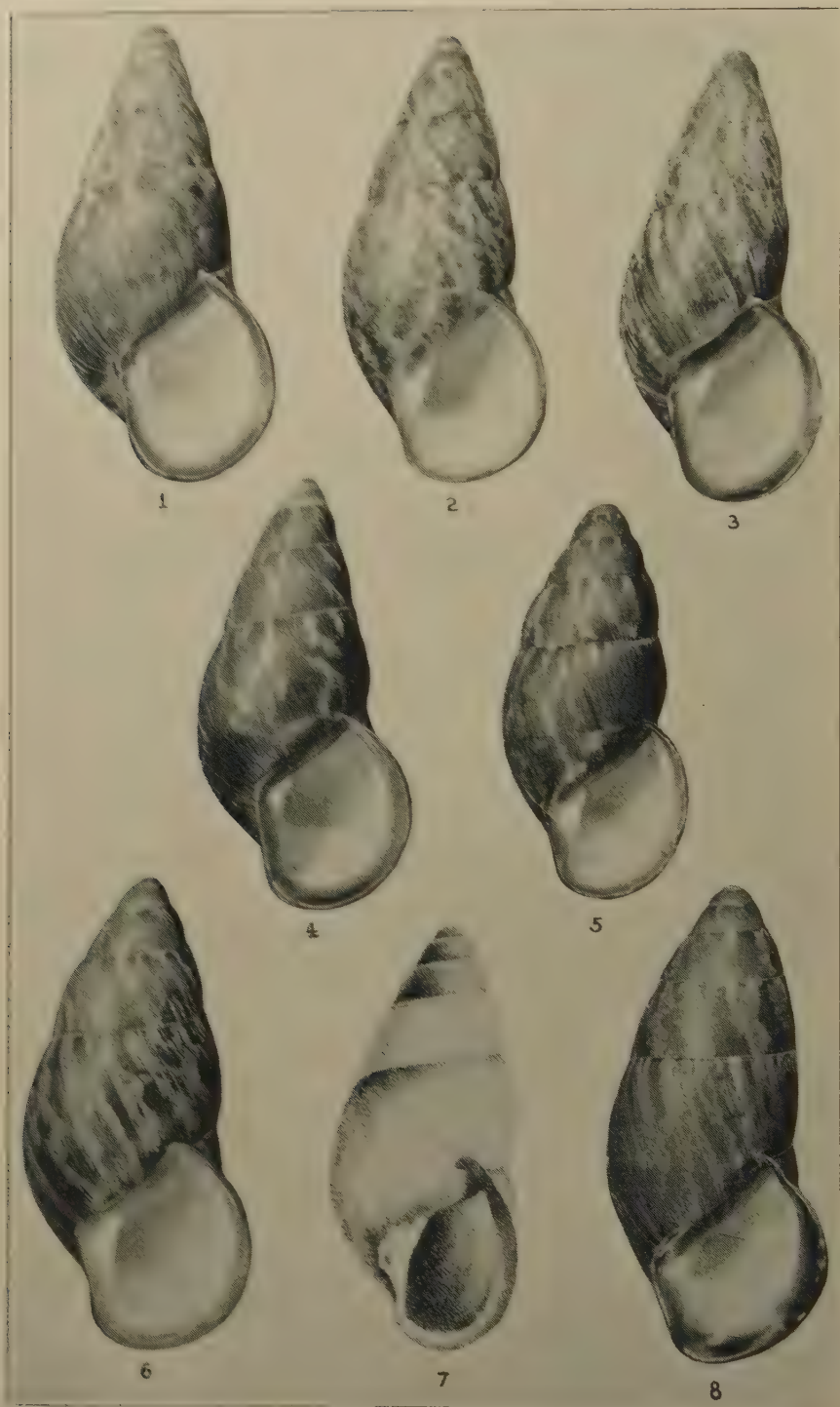
1, *Cochlostyla (Chrysalis) rollei verator* Bartsch; 2, *C. (C.) r. nigra* Bartsch; 3, *C. (C.) palliobasis* Bartsch; 4, *C. (C.) lichenifer avittata* Bartsch; 5, *C. (C.) l. lichenifer* (Möhrh); 6, *C. (C.) rollei rollei* Möllendorff; 7, *C. (C.) r. osborni* Bartsch.



1, *Cochlostyla (Chrysallis) antoni antoni* Semper; 2, *C. (C.) a. macilentia* Bartsch; 3, *C. (C.) roseolabra rosea* Bartsch; 4, *C. (C.) r. roseolabra* Bartsch; 5, *C. (C.) albolabris robusta* Bartsch; 6, *C. (C.) a. albolabris* Bartsch.



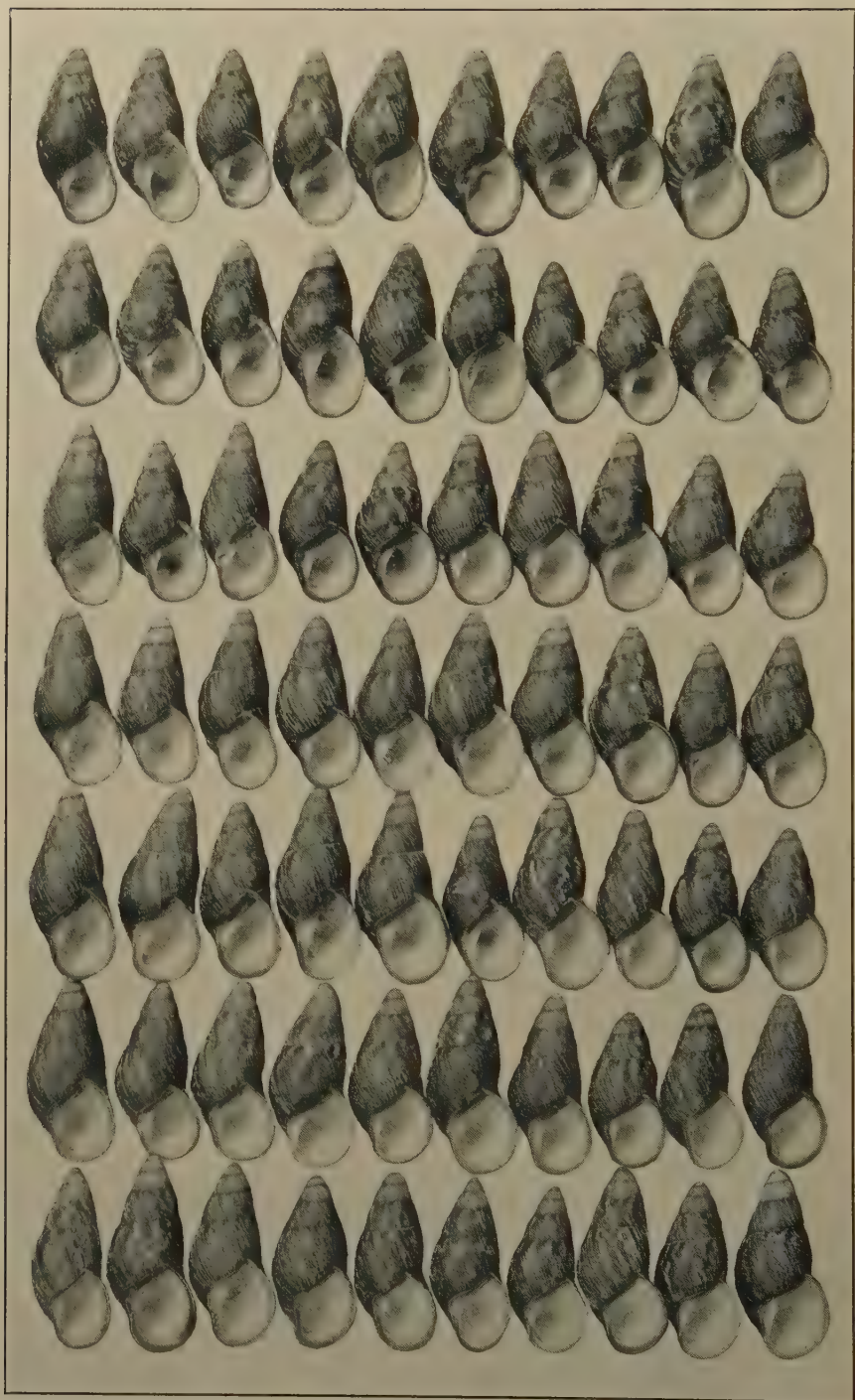
1, *Cochlostyla (Chrysallia) aspersa aspersa* (Grateloup); 2, *C. (C.) a. juani* Bartsch; 3, *C. (C.) a. aspersa* (copy); 4, *C. (C.) a. melanogaster* (Mörch); 5, *C. (C.) a. binuangana* Bartsch; 6, *C. (C.) a. mindoroensis* (Broderip) (copy); 7, *C. (C.) a. lunai* Bartsch; 8, *C. (C.) a. mindoroensis*.



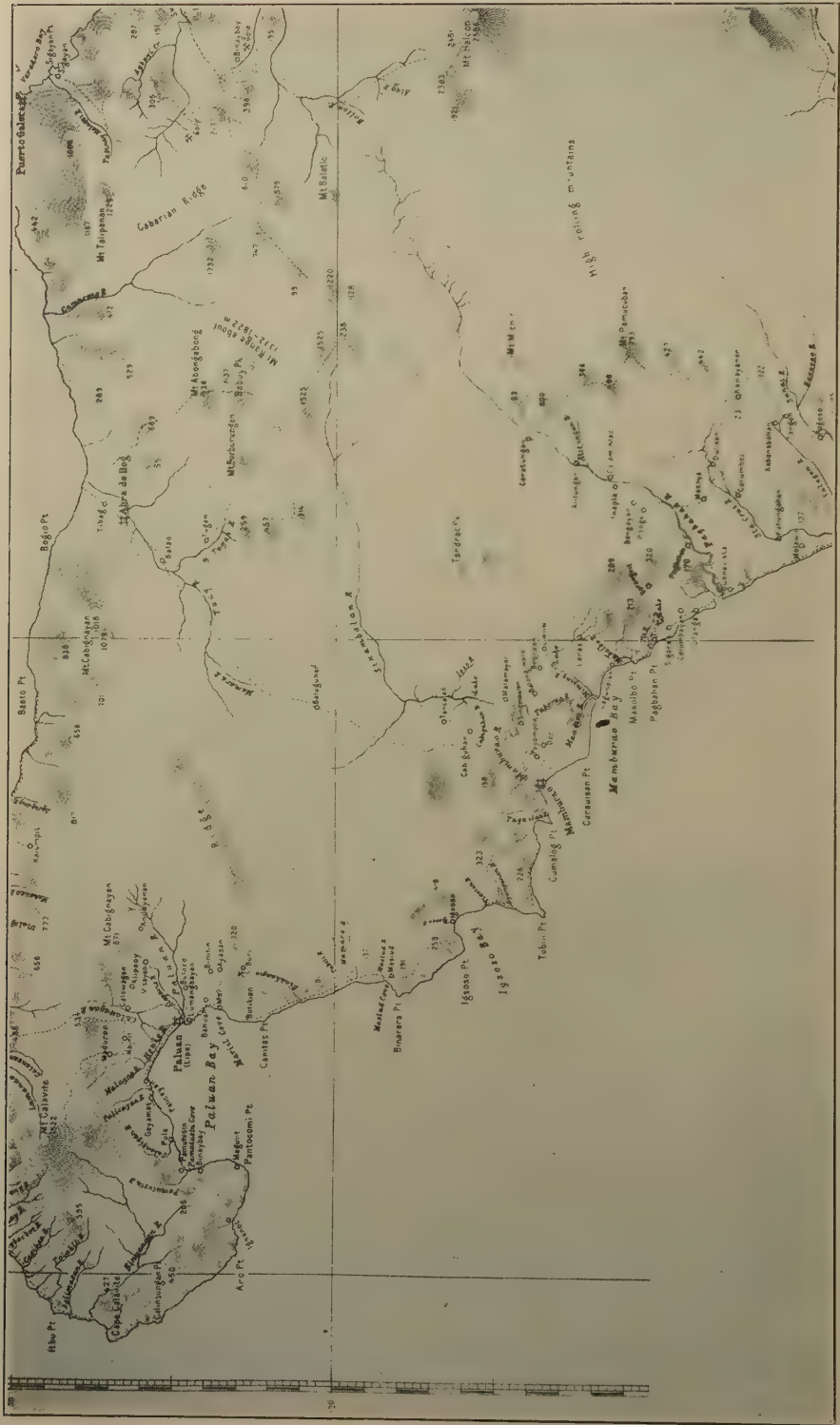
1, *Cochlostyla* (*Chrysallide*) *nigriceps nubilifer* Bartsch; 2, *C. (C.) n. obnubila* Bartsch; 3, *C. (C.) n. nigriceps* Bartsch; 4, *C. (C.) wagneri wagneri* (Gratzeleup); 5, *C. (C.) a. calaritana* Bartsch; 6, *C. (C.) a. edgari* Bartsch; 7, *C. (C.) a. wagneri* (copy); 8, *C. (C.) a. illogana* Bartsch.



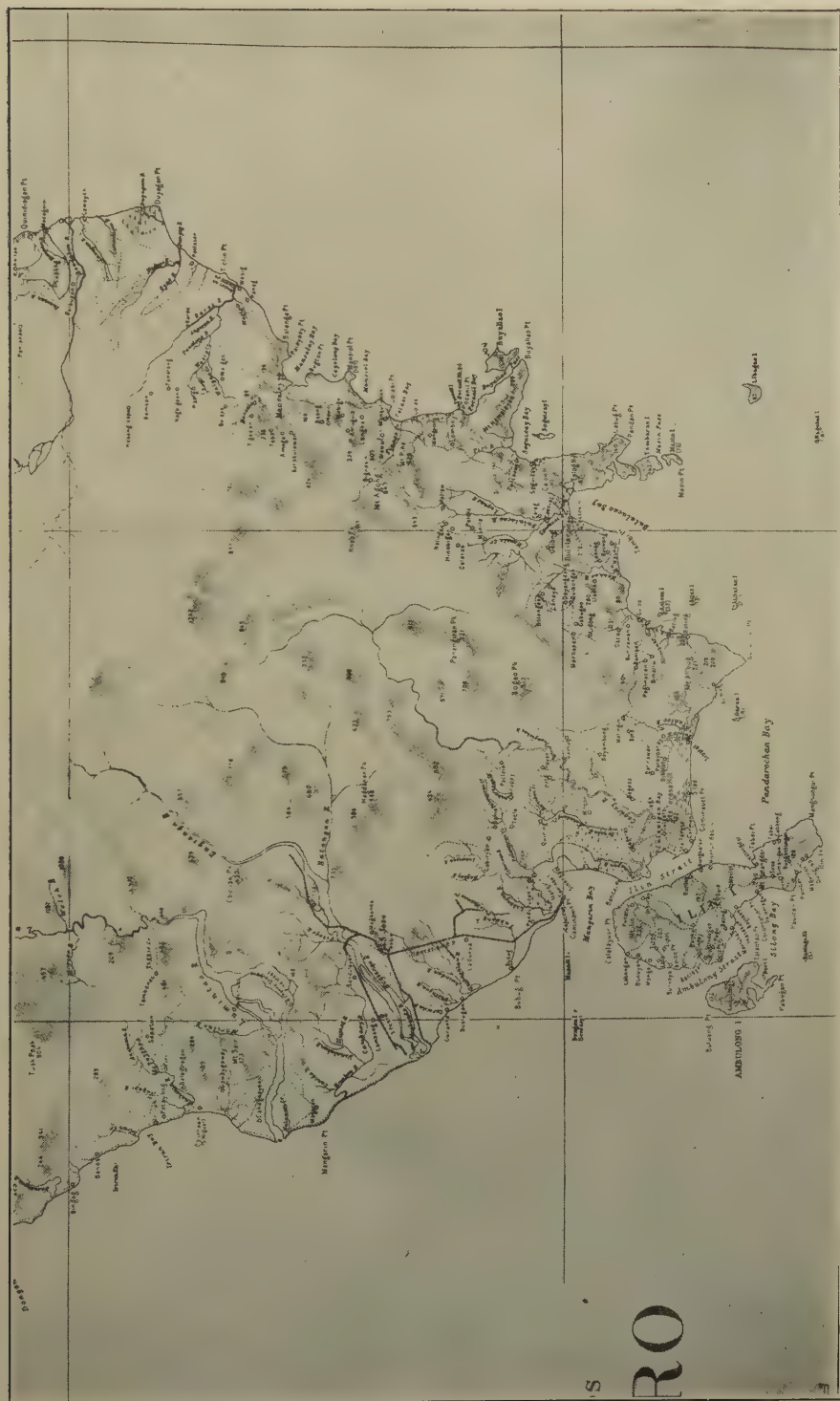
1, *Cochlostyla (Chrysallis) caniceps demesai* Bartsch; 2, *C. (C.) c. contracostana* Bartsch; 3, *C. (C.) c. minuta* Bartsch; 4, *C. (C.) perturbator* Bartsch; 5, *C. (C.) caniceps caniceps* Bartsch; 6, *C. (C.) c. conica* Bartsch; 7, *C. (C.) c. maita* Bartsch.



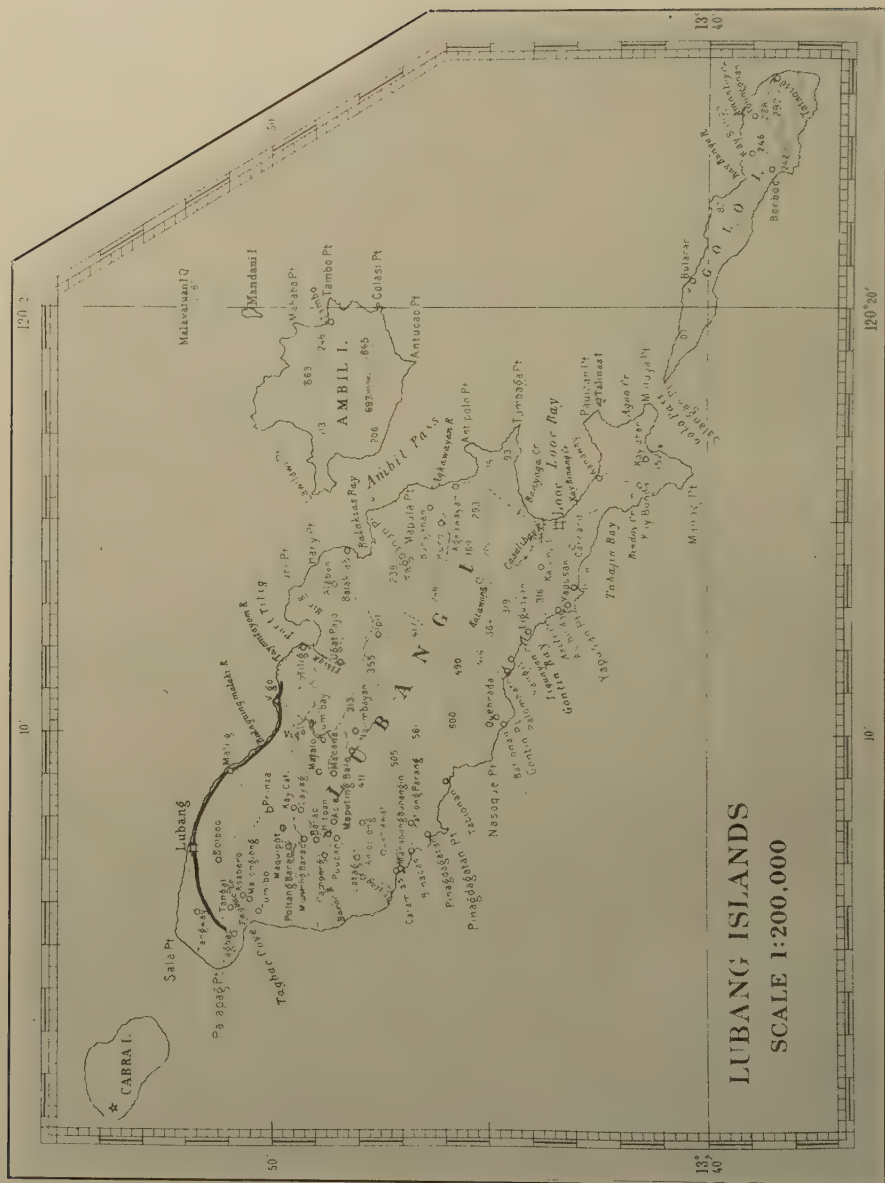
Seventy specimens of *Cochlostyla (Chrysallis) caniceps caniceps* Bartsch taken at random to show constancy of characters.

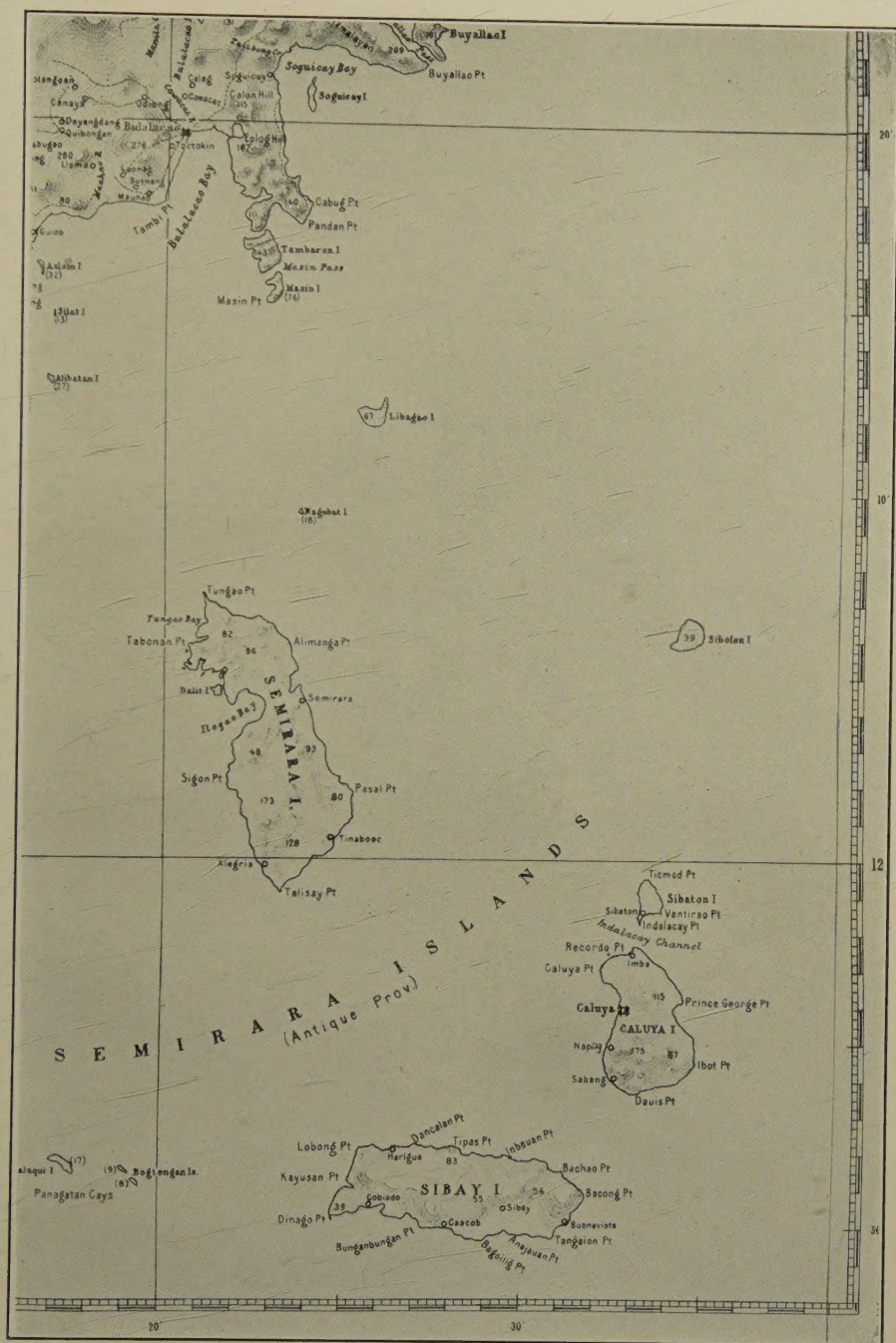


The northwestern portion of Mindoro. From same chart as Plate 116.



The southern portion of Mindoro. From same chart as Plate 116.





The islands southeast of Mindoro. From the same chart as Plate 116.

